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THE NEW SYDENHAM SOCIETY.

INSTITUTED MDCCCLVIII.

VOLUME LXXXVI.

ON

DISEASES OF THE SKIN,

INCLUDING THE

EXANTHEMATA.

BY

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VOL. V.

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THE NEW SYDENHAM SOCIETY,
LONDON.

MDCCCLXXX.

PRINTED BY
J. E. ADLARD, BARTHOLOMEW CLOSE.

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ON

DISEASES OF THE SKIN.

CHAPTER LIX.

(CLASS X.—CUTANEOUS ULCERS.)

By Prof. Kaposi, Vienna.

History.

The designations ἕλκος, ἕλκωσις, ulcus, ulceratio, are as old as the literature of medicine in general. The meaning attached to these terms, formerly, would not, however, by any means fully coincide with our present conceptions; they were used in a far more general sense than is the case now. Inflammatory and neoplastic swellings and tumours, which might, possibly, end in suppurative disintegration, and burst, were called ulcers even before any opening had formed; superficial losses of substance, moreover, involving only the epidermis, as well as what we should now understand by the term ulcer, were included. In order to indicate the direction in which the views held as to the nature of ulcers tended, for centuries, it will suffice to quote representatives of three widely separated epochs—Celsus, the contemporary of Cæsar, Johann Dolæus at the end of the seventeenth, and Benjamin Bell at the end of the eighteenth century, for they all three attributed the wide meaning, above hinted at, to the term ulcer. Thus Celsus,[1] in book xviii, under the title, "De interioribus ulceribus," treats of the following varieties: de carbunculo, de carcinomate, de theriomate, de sacro igne, de chronico ulcere, de ulceribus quæ ex frigore in pedibus et manibus oriuntur, and of thirteen other kinds, among which are struma, acrochordon, clavus, scabies, impetigo, papulæ, vitiligo. He even mentions sycosis[2] as a kind of ulcer.

[1] Celsus, 'Medic. libri octo.' Londini, 1837, p. 186 *et seq.*

[2] L. c., p. 203.

Johannes Dolæus treats of lupus of the face, under the head of ulcer,[1] in the following words: naribus est ulcus quoddam maxime corrosivum et serpens, aliis et dicitur noli me tangere, nonnullis tentigo prava vocatur, quibusdam etiam lupus.

It appears to have wholly escaped observation, that Lorry, about the year 1777, defined the term cutaneous ulcer much more strictly and clearly than his predecessors, for he says of cutaneous ulcers (affectibus ulcerosis) that, in contradistinction to those affections which involve only the superficial structures of the skin (quæ descripsimus mala cutem tantum modo lambebant et ipsi quasi superimposita videbantur), they destroy the substance of the corium itself (nunc quæ suscipimus tractanda depascuntur ipsius cutis substantiam). Yet Benjamin Bell[3] in his treatise on 'Ulcers,' in addition to losses of substance involving the cutis, following the lead of Celsus, also includes herpetic eruptions (Flechten), herpes farinosus, herpes pustulosus, herpes miliaris, and herpes excedens amongst ulcers—an idea which has persisted to some extent until our own times, and has found its expression in the terms ulcera psorica, psorelkosis, used by Fuchs.[4]

The numerous authors who have dealt with ulcers, in special treatises and monographs or general surgical works, towards the end of the last century, and during the first ten years of the present century, have not shown any advance on earlier writers, either in regard to the meaning to be attached to the term ulcer, classification, treatment, or pathology, though they had only to refer to Lorry's treatise to obtain a good foundation. In Rust's[5] 'Helkology,' for instance, which was for long held to be a standard work, scabies, herpes, eczema (Milchborke), scald-head, were regarded as ulcers. As late as the fortieth year of this century, the celebrated surgeon Chelius[6] grouped herpes furfuraceus, crustaceus, squamosus, pustulosus, phlycetenoides, and erythemoides with ulcers. And even in

[1] Dolæus, 'Encyclopædiæ Chirurgicæ rationalis,' lib. i, p. 132, forming a part of the Opera omnia (1 Aufl., 1684). Francof.-a-M., 1703.

[2] Lorry, 'Tractatus de Morbis cutaneis.' Parisiis, 1777, p. 266.

[3] Benjamin Bell, 'On the Theory and Management of Ulcers,' &c., 1791.

[4] C. H. Fuchs, 'Die krankhaften Veränderungen der Haut und ihrer Anhänge.' Göttingen, 1840, 2 Abth., p. 628.

[5] Rust, 'Helkologie.' Wien, 1811.

[6] Chelius, 'Handbuch der Chirurgie.' Heidelberg und Leipzig, 1844, p. 487.

the "successful prize essay on ulcers" by Rex,[1] which, as a rule, is a fairly competent work, ulcers of the leg are spoken of as "vicarious secreting organs," and a very "acrid" property of destroying the substance of the cutis is ascribed to the secretion from the ulcer, just after the manner of authors in the preceding century.[2]

It is only during the last thirty years, coincidently with clearer views as to pathological processes generally, that a truer conception of the process taking place in the formation of an ulcer and the nature of ulcers has been attained. As a consequence, not only was the ontological conception of ulceration discarded, but, also, by degrees, all views as regards classification, characteristics, signification, and treatment of ulcers, which were founded on that conception, and which had to some extent persisted in certain quarters even down to recent times. It is only modern pathology which can be of any service in explaining cutaneous ulceration, and we may, therefore, feel satisfied that the brief historical sketch we have given will be sufficient. Certain topics will, moreover, lead us now and again to refer to the views of previous authors.

Definition.—In accordance with the account given in the introductory portion of this work (vol. i, p. 18) we include, under the term cutaneous ulcer, a loss of substance of the corium communicating directly or indirectly with the surface; produced by preceding local disease (inflammation, new growth); attended by a discharge differing from healthy pus, and, on this account, healing slowly or not at all, because the molecular destruction of tissue either keeps pace with the formation of granulations or exceeds it.

To any one who is acquainted with pathological tissue-processes, it will be clear, from the above definition, that the characters of an ulcer are complex, and on this account, though a concise definition may be given, a more detailed explanation is required.

In the first place, an ulcer is not to be regarded as a positive object, but, rather, has a negative significance. It is a loss of substance, a solution of continuity. Also, it must involve the

[1] Dr. Ignaz Rex, 'Ueber die Geschwüre, eine gekrönte Preisschrift.' Prag., 1854.

[2] L. c., p. 36.

[3] Some modern authors, also, who, in other respects, are quite in the van of recent pathological research, are exposed to criticism on this special point. Thus, O. Weber (Pitha-Billroth's 'Chirurgie,' Bd. 1, p. 519) says "occasionally such hæmorrhages (from ulcers) have a vicarious character, as in abnormal menstruation." . . . . (!)

connective-tissue portion of the skin, the papillary layer, and corium. So long as it is only the epidermis which has disappeared, we have no ulcer, however long the loss of epidermis may persist or however extensive it may be. In *pemphigus foliaceus*, for instance, the loss of epidermis may affect extensive regions, and may take a long time to heal, or may never do so at all. Yet this loss of substance never constitutes an ulcer.

It also follows from this fundamental conception, that a cutaneous ulcer can only heal by the formation of a cicatrix, since it is well known that the special structures of the skin, the papillæ, and glands, are never restored, in whatever way destroyed, and the loss of substance can only be supplied by newly formed connective tissue (scar) incapable of further development.

The loss of substance thus characterised either communicates with the surface directly or indirectly, that is, by means of a fistulous tract. This distinguishes it from destruction of tissue resulting from analogous processes within closed spaces, or in the parenchyma itself. Such an affection is called an abscess.

Any abscess may, however, become an ulcer as soon as an opening has formed, and the loss of substance is exposed to the air, if the other characteristics of an ulcer are present.

In the latter category must be mentioned, besides those already alluded to, the peculiar destruction of tissue.

If, as the result of an intense local inflammation, a more or less extensive portion of tissue undergoes suppurative disorganisation or partial necrosis, as in abscess or furuncle, there follows either immediately on the removal of the tissue more or less sequestrated, or simultaneously with it, the reparation of the loss by new growth, *i.e.* the process of healing. Neither abscess nor necrosis (or gangrene) constitutes, therefore, what we mean by ulceration.

In the latter, there is always, as an essential feature, a continuously advancing molecular destruction of the tissue immediately surrounding the ulcer. This "exfoliatio insensibilis," as it was called by the older authors, forms the fundamental mark of distinction between the process of ulceration and the "exfoliatio sensibilis," that is, necrosis of tissue *en masse*, which constitutes gangrene.

With the steadily progressing molecular destruction of tissue, there is also associated the characteristic peculiarity mentioned last in the definition given above—the want of tendency to heal, whether, owing to the intensity of the necrosis of the tissues, the reparative

process is prevented, *ab initio*, from want of soil, or, that its products are removed, *pari passu*, as soon as formed.

By this means, of necessity, an ulcer may go on spreading indefinitely, as soon as its character has become fully developed.

That this, however, as a matter of fact, does not happen does not, in any way, involve any contradiction between the definition of an ulcer which we have given and the actual state of affairs. It chiefly depends, apart from the anatomico-topographical conditions, on the general and local causes of the ulceration.

General Etiology.

The immediate cause of every ulcer lies in inflammatory or neoplastic processes taking place in the tissue, and which necessitate a steadily progressing disintegration of tissue, quite independently of the fact whether the remote cause is also local or general, and acting from within the organism, or takes effect from without. The normal tissue, as such, never ulcerates. Tissue which undergoes ulceration must have been previously the seat of an inflammatory or neoplastic infiltration. As this causes a degeneration of the affected tissue, a loss of substance occurs, but this is not of necessity an ulcer. It is only when the process so characterised, and with the same result of disintegration of tissue, steadily advancing, attacks the adjacent tissue, and thus leads to steadily advancing loss of tissue that we meet with the characteristic features of ulceration. This proximate cause is such an essential one, both in reference to commencement and continuance, that with its cessation the ulcer also necessarily disappears. As soon as the inflammatory or neoplastic process ceases to spread, the disintegration of tissue is confined within the same limits. There commences at the margin, as in the case of any other loss of substance from whatever cause, the process of repair, the formation of granulations, and healing results.

Such local conditions in the tissues result, however, from very various causes, and, therefore, the causes of cutaneous ulcers may be exceedingly numerous and varied.

Amongst them may be noted all external mechanical and chemical irritants acting directly, or leading to progressive disintegration of tissue by repeated application; for instance, scratching with the finger-nails, pressure, contusions and blows of all sorts, irritating plasters and ointments, &c. Certain alterations in the tissues themselves, acting directly or indirectly, may set up disturbances of

the circulation, stasis, hæmorrhage, spoiling of the tissue, exudation and suppuration, and molecular necrosis. For instance, varicosity of the veins, atheromatous degeneration of the arteries, and chronic dermatitis (chronic eczema) from any cause; and the latter will aid the more, directly in proportion as it has induced dilatation of vessels, persistent congestion of capillaries, chronic infiltration of the connective tissue with lymphatic œdema, hypertrophy of the tissues, connective tissue-, fatty-, or amyloid degeneration, hypertrophy of the bones, and immobility of the soft parts.

Certain new growths, both innocent and malignant, of necessity involve ulceration, because the latter forms part of their course clinically, and is intimately connected with their pathological character—lupus, carcinoma, syphilitic gummata.

The more these influences come into play, either alternately or in combination, the more certainly does ulceration result and the more persistent it becomes.

Those causes, also, which act directly as hindrances to the formation of healthy granulations may also give rise to ulceration. Consequently, any of the mechanical and chemical agencies, above mentioned, acting from without, as well as local mechanical interference with the circulation dependent on the state of the tissues themselves—a bone-callus, varicose veins, induration of the cellular tissue, caries, and necrosis of bone, &c. &c. Even the stability of the granulating surface of the wound and prevention of the process of skinning over by constant wetting, by physiological se- or excretions, such as milk, saliva, the contents of the stomach or intestine, urine, fæces, &c., may be looked on as ulceration, since cicatrisation cannot result under these circumstances, and they may be considered as etiologically allied to the influences previously mentioned. Also, the size and shape of an ulcer, the unfavorable state of the margins and of the base, or of the adjacent tissue (induration, undermining of the margins), extensive and rigid scars, and cicatrisation itself, may serve as hindrances to healing, and may thus be important agents in maintaining ulceration. All these conditions go to make up a *circulus vitiosus*, for they may mutually excite, aggravate, maintain, or again evoke one another, and prevent the abnormal processes of nutrition returning to a state of health.

As more remote causes of the production of ulceration of the skin may be mentioned all those influences which call forth or maintain the three local factors above mentioned—inflammation (local disturb-

ance of circulation), new growth, and mechanical destruction of tissue. Amongst these, certain special cachectic conditions, such as anæmia, senile marasmus, syphilitic and scrofulous states of the constitution, and scurvy, will occupy an important place; amongst the external remote causes, we must mention the various evil influences of different occupations.

As we are here merely dealing with the general question of the etiology of ulceration, we will discuss these conditions further in reference to certain special forms and localisations of ulcers which seem of particular importance.

Symptomatology.

The clinical character of a cutaneous ulcer is derived from the state of its base, secretion and margin, its form and mode of progress.

We distinguish, in the first place, between the base and the margin of the ulcer.

The base is formed by the tissue undergoing disintegration. It may be deeper towards the periphery, or is flatter, or unequally pitted, of a yellowish-grey colour, as if infiltrated with pus ("fatty" appearance), or furnished with a few red granulations or none at all.

The margin proper, *i.e.* the innermost limiting portion of the adjacent tissues, has the same fatty, purulent appearance as the base, as it is formed of tissue undergoing disintegration. It presents a more or less abrupt edge towards the base and is raised above it, and even occasionally above the level of adjacent parts; it may be smooth or indented, may slope steeply or gradually to the base, or be undermined, excavated, and may somewhat overhang the base.

In chronic ulcers the margin sometimes appears thickened, hard (callous), firmly united to the subjacent tissues, and everted or inverted.

The tissue surrounding the margin and base of the ulcer is either but slightly altered, as in simple inflammatory or scrofulous ulcers; or it presents symptoms indicating the characters of the process lying at the foundation of the ulcerative degeneration, inflammatory swelling and infiltration in phlegmonous ulcers, and in chancre, for instance; or neoplastic infiltration in gummous, lupoid, and carcinomatous ulcers.

Ulcers secrete a more or less copious discharge, which, as a rule, differs in character from the so-called laudable pus. It is either

abundant, rather thin and fluid, poor in cells,whey-like in consistency, or of a dark yellowish-green colour, and smells badly; or it is scanty and thin, and of viscid, sticky consistency.[1]

The discharge dries up, if left on the ulcer, into yellowish-green, brown, or blackish-brown scales of various thicknesses; or, if of viscid consistence, into a thin, varnish-like, glistening crust.

The shape of an ulcer, at the commencement, is generally circular, and it may remain so, even when the ulcer has attained a large size. It is only when its dimensions are very considerable that it becomes oval or irregular in shape. At the same time, it either spreads deeply and becomes excavated, crater-like, or it spreads superficially and becomes sinuous at the margin, or kidney-like in shape—alterations of form which depend on the locality affected and the special manner of progress of the ulcer.

Subjective Symptoms.

Cutaneous ulcers are generally accompanied by painful sensations, which usually correspond in degree to the intensity of the inflammatory process which accompanies the ulceration. The pain may, however, be out of all proportion to the former—irritable ulcers, or sensation may be much diminished—atonic ulcers. These conditions may also vary very much during the progress of the ulcer, and alternate with one another.

Progress.

In the first place, the course of cutaneous ulcers may be said to follow a general type, as is seen more characteristically in the so-called, simple inflammatory ulcers, or in the chancrous ulcers due to a specific poison.

According to this type, an ulcer, when once begun, increases, while retaining its original character, by continuous disintegration of pre-

[1] Some authors maintain that the discharge from an ulcer contains "an excess of salts," especially phosphate of soda, and in the so-called "arthritic ulcers," lithate of soda (in support of the "lithic acid diathesis" supposed to be at the foundation of gout and rheumatism). In reference to anomalous, especially "blue" coloured pus from wounds and ulcers, various authors have published observations; for instance, Lücke (Langenbeck's 'Arch.,' 2 Bd.), and, quite recently, Girard ('Centralbl. für Chirurg.,' 1875, No. 50), who does not attribute the blue discoloration to vibrios of a blue colour, but to the colouring matters pyocyanin and pyoxanthose, originally discovered by Fordaz. Girard also considers that the blue pus has a peculiar odour.

viously inflamed tissue, until it has attained a certain size. Sooner or later, the ulcer appears to remain stationary. This stage, however, temporarily passes into one of renewed disposition to further extension. This stage, which, as a rule, only lasts a few weeks, but may, however, under particular circumstances and various etiological influences, last much longer, is known as the *stadium destructionis*.

From that period, the *stadium reparationis* commences.

Coincidently with marked decrease in the inflammation and swelling of the tissues, in the pain, and the discharge, bright-red points (granulations) make their appearance at the margin and base; at first, these allow the tissue infiltrated with pus situated in the intervening depressions to be recognised, but gradually they increase in size and number. By this means the borders soon appear smooth and flattened and the base raised, and both are of a bright-red colour, having the aspect of a granulating wound.

When the granulations growing from the base have reached the level of the surrounding tissues, or even earlier, newly formed epidermis begins to advance from the epidermis at the margin, at first in the form of a bluish white, and later, of a white pellicle, which covers the granulations at the margin of the wound and advances towards the centre. As soon as the epidermic covering spreading on all sides from the margin reaches the centre of the wound, the healing of the latter, the cicatrisation, is complete.

The new connective tissue, deficient in papillæ, follicles, and glands, replacing the loss of substance, constitutes the scar.

This, at first, appears of a rosy tint, but becomes paler in course of time, owing to obliteration of its vessels, and, finally, has a white, glistening, smooth appearance.

In regard to the intimate nature of the process of cicatrisation, the disturbances which may occur in its course, and the histological character of the cicatrix itself, we have already spoken in detail in another place (vol. iii, p. 299, &c.), so that we need, here, only refer our readers to the account there given, for further details.

The ulcer may show departures from this typical course at any stage, and in various directions. In the stadium destructionis, in association with erysipelatous inflammation of the adjacent tissue and copious discharge, a rapid suppurative degeneration of tissue may ensue—the *phlegmonous or phagedænic ulcer;* or, instead, a drier necrosis of tissue may occur, the skin and subcutaneous cellular tissue and all subjacent tissue bein converted into a tinder-

like mass—the *gangrenous ulcer;* or, at the same time that the discharge diminishes, the base of the ulcer becomes covered with a yellowish-white, discoloured, firmly adherent, membranous layer, which shows little tendency to disintegrate, and, if removed, is quickly replaced by a fresh one—the *diphtheritic ulcer*. The ulcers which result from the disintegration of syphilitic tubercles have a very characteristic course. At first circular, they soon become kidney-shaped, owing to cicatrisation proceeding from the hilus, whilst fresh syphilitic infiltration and ulcerative destruction go on at the periphery. Since cicatrisation, on the one side, is associated with the occurrence of fresh infiltration and ulceration on the other, the process of ulceration may, in the course of months and years, advance very far from the part originally affected and traverse large tracts of skin.

As a similar process of ulceration proceeds from several tubercles originally separate from one another, the segments advancing towards the periphery of the area affected, at last touch one another, and thus a *serpiginous* ulcer is formed. This advances, therefore, as a segment of a circle whose convex border is formed by the ulcerating margin sloping abruptly inwards, whilst the inner border is represented by the cicatrix, which shades off gradually into the granulating surface.

In the stadium reparationis, departures from this typical course may occur, which generally take the form of disturbances or delays in the process of cicatrisation. The ulcer, for instance, may not increase in size, but may not show the slightest tendency to the formation of normal granulations, the discharge may consist of a small quantity of thin pus, the margins may be indolent and flabby, the granulations on the surface of the ulcer may be scanty and pale or of a dark, brownish-red colour and dry, there may be no definite symptoms of reaction around the ulcer and its sensitiveness may be slight—the atonic ulcer. These abnormalities are met with most frequently in ulcers occurring in marasmic (senile) individuals, or in the anæmic, even at an early age. Or the reparative process may begin fairly, but may be frequently interfered with by all sorts of circumstances, partly dependent on the state of the tissues themselves and of the organism, and partly on external influences (mechanical and chemical). For instance, at one time the granulations may be too luxuriant (caro luxurians), and may thus impede the progress of the margin of cicatrisation. Or they may be

œdematous, or hæmorrhage may take place from time to time in them, and the new tissue may disintegrate as soon as formed. Or such local and external mechanical or chemical influences as we have already treated of in detail under the head of general etiology, p. 5, may interrupt the process of healing.[1]

Nosological significance of Cutaneous Ulcers.

According to the account above given of the essential characters and the direct and indirect causes of cutaneous ulcers, they would appear to be the direct result of a pathological change in the tissues themselves; of the inflammatory infiltration, of the venous capillary stasis and hæmorrhagic destruction of tissue, of the syphilitic or of the carcinomatous infiltration, &c. It seems, therefore, *à priori*, quite superfluous from our present scientific standpoint to engage in any refutation of the ontological notions in reference to ulcers, which were formerly entertained very generally by physicians and laymen, to the detriment of science, and, still more, of the patient.

The old idea of the "entity" of different forms of ulcers has in most cases been given up. The "Tentigo prava, the "Noli me tangere," the "Ulcus rodens," and similar undefinable designations, must lose any special entity in proportion as we can recognise in them definite and well-recognised pathological tissue changes and processes—carcinoma, lupus, syphilis, sarcoma, &c. Even the ulcer of the foot, known for long in literature as "Mal perforant du pied," has had to resign its ontological character under the pathologico-anatomical criticism of the last few years, and appears to include a number of ulcerative processes, which, in relation to cause are not by any means doubtful (leprous, syphilitic, traumatic ulcerations, and synovial affections, neuroparalytic gangrene, &c.)[2]

Unfortunately, this view, which is the sole trustworthy one, namely, that the ulcer is merely the expression of a molecular necro-biosis set up by special, local, pathological nutritive processes and tissue changes, and, therefore, represents only a stage in the course of a well-known pathological process, has not become universally accepted for all forms of ulceration. Even at the present time common ulcers of the leg, the causes of which are probably well understood, have a sort of organic individuality ascribed to

[1] In reference to the details of the process of healing of wounds we must also refer to the account given at p. 299, &c., vol. iii, of this work.

[2] Bruns, 'Berl. Klin. Wochenschrift,' 1895, 30, 31 u. 32.

them, in virtue of which they are supposed to be analogous to certain secretory organs, the purulent discharge from them representing the physiological secretions from such organs. Thus they are said to be associated with the kidneys and their function, or with the uterus and its periodical discharges of blood, or with hæmorrhoids, diseases of the heart, &c., in a vicarious manner as regards the former, or organically as regards the latter. It therefore follows, further, that their existence is a physiological necessity in reference to the maintenance of the equilibrium of the processes going on in the organism; that their removal (that is, healing) may lead to a disturbance of that equilibrium, and, therefore, to all sorts of injurious and even dangerous consequences, such as dropsy, œdema of the lung, &c.

Against this view, which formerly prevailed extensively, but now only crops up here and there, and in a mild form, though unfortunately it is still held by certain pathologists of note, I have to state the following:

We know of no cancerous ulcer without a local new growth of cancer preceding it, and of no syphilitic ulcer which has not had a demonstrably syphilitic infiltration (gumma, tubercle) for its starting-point. Neither are we acquainted with any cutaneous ulcer of the leg, whatever, which originates in healthy skin. There must always be some antecedent, local, pathological change of tissue; inflammation following on mechanical injury, stasis in the vessels, as in varices, infiltration, as in chronic dermatitis, in varices, in chronic eczema, pressure from a callus after fracture, &c. In short, with care and a good will we shall never be at a loss as to the origin of any ulcer.

We are equally well informed as to the whole series of those local and external influences which tend to perpetuate the ulcer when it has once originated; that is, retard its cure. We know that at one time certain irremediable conditions of the tissues may be in fault, such as varicosities of the veins, and, as a consequence, stagnation of the blood-current, or there may be atheromatous degeneration of the vessels; another time and at a later stage the size of the ulcer itself, the induration of the surrounding tissues, or repeated hæmorrhages into the granulations, may act injuriously; and, lastly, pressure, blows, stretching, inappropriate treatment, and injudicious conduct in general, perpetuate and increase the ulcerative process. In short, for the full comprehension of an ulcer of the leg we need

not look beyond the part itself affected by the ulcer, or at any rate only to regions in direct anatomical relation with the diseased part; for instance, the corresponding tracts of lymph- and blood-vessels.

As we are, therefore, always able to discover the influences which produce an ulcer of the leg, in the local, pathologico-anatomical conditions, we must decline to admit any sort of connection with the uterus, kidneys, or other organs, except of a mechanical character; for instance, the exercise of pressure on the returning vessels setting up just those local conditions, especially stagnation of the circulation in the lower extremities, which we have already mentioned as the efficient local cause in many cases of ulcer.

Any relationship of functional interchange, however, between ulcers of the leg and internal organs situated remotely, we must distinctly deny. We only see a mechanical stagnation or mechanical injury at work in causing a periodical hæmorrhage from an ulcer of the leg. We never regard such as exercising any vicarious function in reference to menstruation.[1] Neither can we understand in what way any ill result should accrue to the general system from the rapid or complete healing of a chronic ulcer of the leg. And, lastly, we cannot understand how a seton inserted in the arm should counteract such an undemonstrable, evil influence, and should functionally replace the ulcer on the leg.[2] We must warn beginners, in the interests of scientific truth and appropriate practical procedures, against any such undemonstrated and undemonstrable lucubrations, even when we owe them to the pen of a pathologist of such sterling worth in other respects.

We invariably find that every ulcer of the foot is solely the direct result of a thoroughly demonstrable, local, direct, or indirect disturbance of nutrition of the tissue. We regard the ulcer as a bodily injury, just like a broken bone or a traumatic lesion of any sort; and we do not hesitate to use the best remedies which experience affords, to effect as rapid and permanent a cure of the ulcer of the leg as possible, without in the least dreading any further ill-consequences to the system generally, than after the cure of a broken bone.

Inasmuch as those who hold the opinion just called in question are neither in a position to show us how we can heal an ulcer "too quickly," nor how we are to exercise "circumspection" in the

[1] O. Weber, l. c.

[2] See O. Weber, l. c.

matter, nor, further, are able by facts or scientific demonstration of any sort to make clear to us what ill-result follows on the healing of the ulcer, nor, lastly, have enabled us in any way to comprehend the relation which exists between a seton in the arm and an ulcer in the leg, it will be most suitable for us to disregard such worthless theories and pass on to our proper business.

Consequences of Ulcers.

From what has been said in reference to the nosological significance of ulcers, it will be clear that they can, as a rule, entail no other local or general consequences than those belonging to the process of destruction and the inflammatory changes of necessity associated, or, at any rate, only such others as are due, *ab initio*, to the specific influences causing the ulcers themselves. To the former category, in addition to the destruction of the tissue and its replacement by a cicatrix, belongs the danger of lymphangitis, erysipelas, phlebitis, pyæmia; to the latter belong the specific secondary lesions, for instance, in cancerous and sarcomatous ulcerations. The loss of substance is of the more importance in direct relation to the functional value of the structures affected, for instance, the skin of the face, or the skin over the joints, &c.

Ulcers, as a rule, unless they are of a specific character, only exercise the same effect on the general system as other chronic, exudative, and suppurative processes, they generally tend to debilitate and emaciate. It must, however, be noted that in very many cases in which inflammatory ulcers have existed for years, the general system does not appear to be affected injuriously in the least.

In reference to the significance of the cicatrix as a new growth, the nature of the process of its formation, its nosological and supposed diagnostic value, we have already treated in detail at pp. 299-310, vol. iii, of this work, and we shall therefore refer to that place for information on all these points.

Anatomy of Ulcers.

The general type of the anatomical and histological conditions met with in ulcers is well illustrated by those met with in the simple chancrous ulcer. We may, therefore, adduce them, here, in detail, as a sort of general schema.[1]

[1] See Kaposi, 'Die Syphilis der Haut und der angrenzenden Schleimhäute.

A microscopic examination of a typical soft chancre shows that it is divisible into two parts, an ulcerating portion and a non-ulcerated part surrounding the former, and consisting of the tissue forming the margin and base of the ulcer in a state of inflammation.

The ulcerated portion has an uneven surface, being variously excavated in relation to the surrounding parts, and secretes a con-

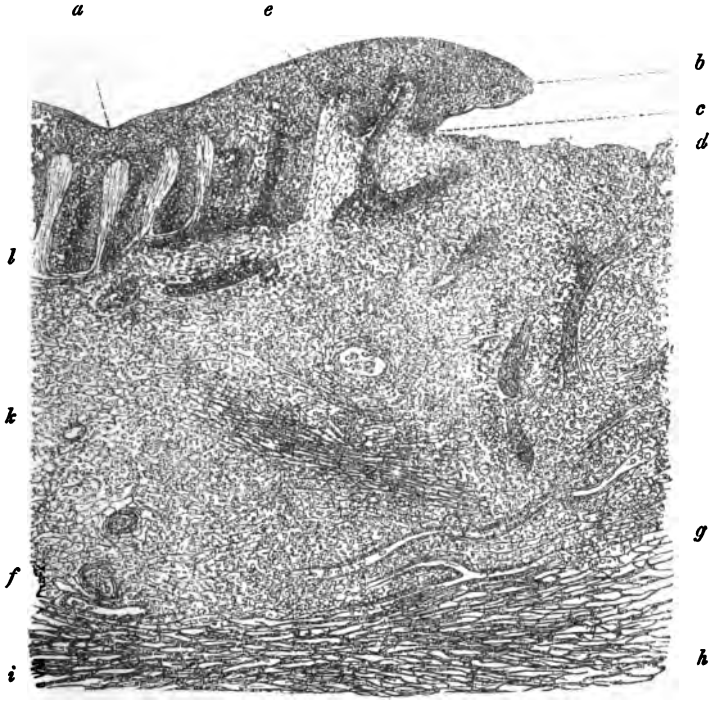


FIG. 1.—Section of a soft chancre (Hartnack, oc. 3, obj. 4); *ab*, the prominent wall-like margin of the ulcer; *cd*, base of the ulcer; *bc*, epidermis forming the undermined margin; *cd, fg*, tissue infiltrated with cells (at right angles to the surface of the chancre), traversed by numerous enlarged blood-vessels; *fg, hi*, wide-meshed (œdematous) tisssue, free from cell infiltration, beneath the base of the chancre; *e*, enlarged papillæ infiltrated with cells; of these, a series to the left are elongated and partly œdematous; *k*, prolongation of the tissue infiltrated with cells, beneath the uninjured papillæ of the margin of the chancre.

mit 76 chromolithographirten Tafeln,' Wien, Braumüller (in 3 Heften), 1873, 1874, und 1875. Figures 6 and 7 (p. 42 und 43, l. c.) are taken from this work.

siderable quantity of pus. The tissue forming the base of the ulcer also appears, at least in its most superficial layers, infiltrated with pus. The borders of the ulcer present the same characters.

The microscopic examination of a section at right angles to the surface, and passing through the margin and the inflamed surrounding parts, as well as the base of the ulcer and its inflamed substratum, shows that the ulcerated portion of skin consists of two manifestly distinct parts pathologically altered.

From the surface of the ulcer (fig. 1, *cd*) a uniform and extraordinarily thick cellular infiltration passes for a certain distance deeply into the corium. Here it terminates, being fairly sharply defined (the line *fg*). The cellular infiltration also penetrates for some distance laterally beneath the uninjured papillæ of the margin of the ulcer (*el*) beyond the limits of the surface of the ulcer (*k*). The tissue adjacent to the part infiltrated with cells appears to have wide meshes containing only a few cells provided with large highly refracting nuclei, which are well stained by carmine (œdema).

The prominent margin of the ulcer (*ab*) is formed in part by a whole group of swollen papillæ immediately adjoining the ulcer, and two of them situated nearest to the surface of the ulcer (*e*) are also enlarged and densely infiltrated with cells; over and between the papillæ named, the Malpighian layer is increased in thickness. It overhangs (*b*) the surface of the ulcer.

The surface of the ulcer (*cd*) is formed by the exposed corium infiltrated with cells, the papillæ being wanting here. The corium and the papillæ, where infiltrated with cells, show numerous and considerably enlarged vessels.

With the aid of increased magnifying power (fig. 2) the part (*ab, cd*) infiltrated with cells is found to consist of a net- and mesh-work, having in some places narrow, and in others wide, meshes composed of broad, delicate bands with pale contours, and containing both very large nucleated cells, resembling lymph corpuscles, and also smaller ones, in great quantity and uniformly distributed.

The cells which lie free on the surface of the ulcer, and those in the layers immediately adjoining, are, for the most part, small, of irregular shape, and contain granules, which tend to conceal the nucleus. In addition to the cells thus characterised, there are also numerous free nuclei and granules.

The remarkable thickening of the vascular wall (*e, d, f*), due to a transformation of the parallel fibrous arrangement of the adventitia into a network with large meshes, is of great interest. In the network there are isolated cells with large nuclei.

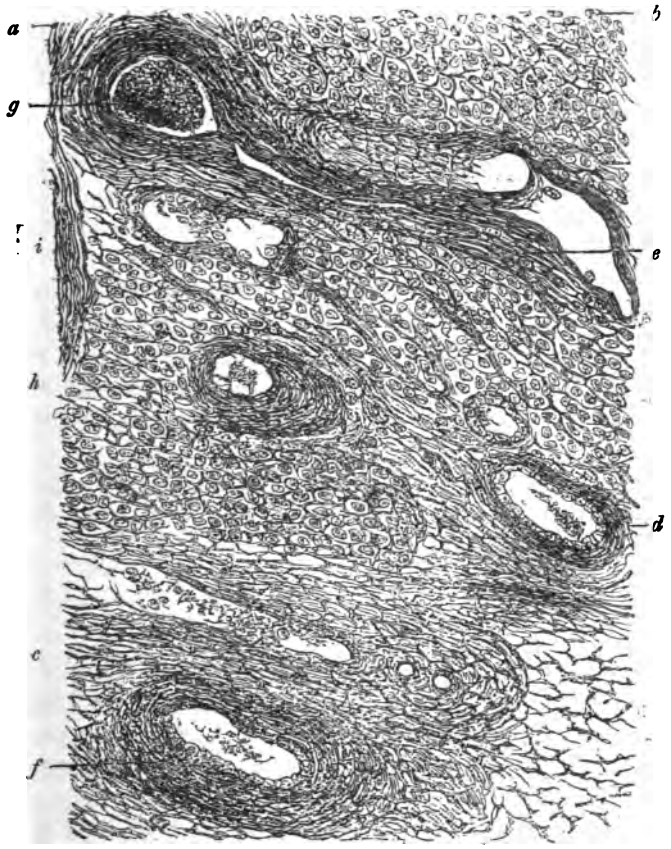


FIG. 2.—Section of a soft chancre (Hartnack, oc. 3, obj. 7). Taken from the neighbourhood of *f g* (fig. 1), and including the deepest part of the tissue infiltrated with cells, forming the base of the chancre and a part of the immediately subjacent, uninfiltrated, œdematous tissue. *ab, cd*, deepest part of the base of the chancre infiltrated with cells; in part, it shows small—in part, wide meshes, containing everywhere a dense infiltration of cells; at *ge*, there is an enlarged blood-vessel; at *g*, an accumulation of red blood-corpuscles in it; at *e, d, f, g*, a marked thickening of the wall (adventitia) of blood-vesssels; at *i* and *c* probably lymphatics.

The lumina of the vessels appear widened both in the region

infiltrated with cells and, also, in the œdematous part immediately adjacent.

The destruction of tissue and of the infiltrated cells, of which the ulcer is the external evidence, occurs only in the most superficial, and, in relation to the depth of the cellular infiltration, only shallow layers. It is this also which causes the peculiar clinical appearance of ulceration (des "Geschwürigseins"). In histological characters, the surrounding parts do not differ in any respect from such as are undergoing inflammation without suppuration.

All other kinds of inflammatory ulcers, such, for instance, as those due to varicose veins, correspond to the type of the chancre.

Variations in the histological conditions depend on specific peculiarities of the ulcer, or on accidental complications.

Thus, in lupous and carcinomatous ulcerations, we find the cell-nests peculiar to these two processes, in the tissue adjoining the ulcerating parts. In chronic inflammatory ulcers, we find, adjacent to the disintegrating part, dense connective tissue, scantily supplied with cells and vessels, containing but little serous fluid, and resembling indurated (callous) tissue or scar.

The superficial part, however, constituting the essential portion of the ulcer, is of a completely analogous character in all forms of ulcer.

Division of Ulcers.

The older authors devoted a great deal of trouble to the classification of ulcers. In some quarters great acuteness and ingenuity were employed in order to make the symptoms observed and the theories grafted on them fit in with the classification and nomenclature. Owing to the multiplicity of the former and the great subjectiveness of the latter their efforts in this direction necessarily bore much fruit. Thus arose the numerous chief and sub-classes, and the somewhat, from our point of view, oddly-sounding designations of the various forms of ulcers, such as ulcus arthriticum, rheumaticum, hæmorrhoidale, abdominale, hepaticum, psoricum, urinosum, menstruale, pseudoleprosum, physconiatum, viscerale, specificum, scrophulosum, scorbuticum, varicosum, carcinodes—according to the supposed causes; ulcus erethicum, hypersthenicum, asthenicum, inflammatorium, atonicum, synochale, fungosum, spongiosum, gangrænosum, diphtheriticum, simplex, ichorosum, putri-

dum, escharoticum, crustosum, serpiginosum, rodens, verrucosum, callosum, œdematosum, &c.—according to the special clinical character, appearance, temporary condition, &c.

The account which we have already given of the essential character and course of ulcers renders it unnecessary for us, now, to show that such a mode of classification of ulcers is clinically without any foundation, needless, and untenable.

From the explanations which we have formerly given, it will be evident that all forms of ulceration result from pathological processes, inflammation or new-growth previously set up in the skin, and that any special character they may have is due entirely to the specificity of their direct local cause. A suitable and systematic classification of ulcers must, therefore, be based on the local causes which give rise to them, and the ulcer will then be regarded merely as a stage in the involution or disintegration of the existing local disturbance of nutrition.

It appears to me we shall succeed best if we divide ulcers into—

I. Ulcers arising from circumscribed or diffused inflammation.
   (*a*) Not contagious—1, idiopathic; 2, symptomatic.
   (*b*) Contagious.

II. Ulcers associated with new growths.
   (*a*) Lupus.
   (*b*) Lepra.
   (*c*) Carcinoma.
   (*d*) Syphilis.

Though we have already (p. 5), in discussing the causes in general which are re-enumerated in the classification just sketched out, given, *de facto*, the course and the general character of the ulcer resulting in each case, and which must be well known to any one familiar with the pathology of the processes named, it may still be not wholly without profit to consider in special detail the various forms of ulcer as viewed from our standpoint.

I. ULCERS ORIGINATING FROM INFLAMMATION (IN INFLAMED TISSUES).

As a rule, acute inflammation, *per se*, does not lead to ulceration. It results either in resolution, *i.e.* the reabsorption of the exudation, or in suppuration, *i.e.* necrobiose en masse. The latter either commences deeply and an abscess forms, or the disintegration begins at the surface, in consequence, for instance, of traumatic or chemical agencies.

In both cases, the necrosed portions of tissue are cast off according to a common plan, the granulation process which precedes the shedding persists till the loss of substance is replaced, and the cicatrisation proceeding from the margin is complete.

If an ulcer results from the inflammation, this can only occur, in the first place, under such conditions as cause molecular disintegration of tissue, whether continuously or renewed from time to time. In the former case, the loss of substance will take the form of a persistent ulcer. In the latter, the appearance of ulceration may alternate with the condition of a wound undergoing repair. Both come under the category of simple inflammatory ulcers. They are also non-contagious in character.

Or, in the second place, the inflammation, from the commencement, leads to the formation of an ulcer, because the specific character of the agent setting up the inflammation shows itself, among other things, by the affected tissue undergoing a typical molecular disintegration; and we then speak of specific inflammatory ulcers. They are, at the same time, of a contagious character.

(*a.*) SIMPLE NON-CONTAGIOUS INFLAMMATORY ULCERS.

The inflammation which, in the manner just detailed, leads to ulceration may arise idiopathically, and on this account we may name the resulting ulcers (1) idiopathic. Under this group will come all ulcers due to injury, scratching, mechanical and chemical lesions, and local disturbances of the circulation, as in varicose veins.

Here, also, belong the fistulous, so-called carious ulcers, which form over carious bone, and are characterised, as a rule, by the fungoid state of their borders and the depression of the centre. Finally, we include, also, the fistulous ulcers which are prevented from cicatrising by the continual contact of physiological se- and excretions (saliva, the contents of the stomach and intestine, milk, urine) with the surface of the wound.

Or, the inflammation which causes the ulcer is set up by some special constitutional condition. The ulcers so caused are symptoms of a special dyscrasia. They generally present features which point to this dyscrasia, and may be called (2) symptomatic.

(1) *Idiopathic Non-contagious (inflammatory) Ulcers.*

The ulcer which results from simple inflammation shows the typical characters of an ulcer most clearly. Its symptoms, therefore, are those given in describing the general characters (p. 7), and they are met with most definitely and in greater completeness where the causes which give rise to ulceration are most frequently in action and in various combinations.

This is the case with inflammations occurring on the lower extremities. Here we generally have those influences at work, either temporarily, or even permanently, which we have already enumerated, more especially under the head of "general etiology," and which prevent the inflammation proceeding to a normal termination, or the loss of substance set up by mechanical or chemical agencies being replaced and healed over; pressure, owing to the weight of the body, stretching in walking or standing, friction from the clothes or bandages, stretching of the skin over the crest of the tibia, insufficient subcutaneous connective tissue, chronic stagnation of blood in varicosity of the veins, hæmorrhages in consequence of the latter; in fact, all agencies which partly excite repeated attacks of inflammation, and partly lead to direct destruction of tissue, whether of old tissue or of the new granulations replacing the loss of substance, that is, excite and maintain ulceration.

Under these circumstances, we also, of course, meet with almost all the symptoms, varieties of progress, and complications, which can possibly occur in ulcers of this sort, and are of importance, not only for the mastery of their pathology, but also for their treatment.

As, moreover, many errors still prevail at the present time in

regard to the significance, mode of treatment, and contingencies of ulcers of the leg, and as they very frequently come under medical treatment, it does not seem superfluous to enter into some detail in reference to ulcers of the leg—ulcera cruris.

ULCERS OF THE LEG, ULCERA CRURIS.

Under the collective term ulcer of the leg (ulcus cruris), which has been adopted into scientific nomenclature from popular use, we do not by any means include all the forms of ulcer met with on the leg. We rather designate as such only those forms which we have previously mentioned as resulting from ordinary inflammation. All those forms of ulcer therefore are at once excluded which we have classed in the second group of ulcers under *d*, *e*, *f*, *g*, *h*, and which we shall discuss in more detail in the following chapter. For these latter are designated, according to the special neoplastic process giving rise to them, as lupoid, leprous, carcinomatous, or syphilitic ulcers, though they may happen to occur on the lower extremities.

As will be evident from what has been adduced already in various places, the group of symptoms met with in connection with ulcers due to inflammation, and, more especially, when they occur on the lower extremities, are extraordinarily varied in character. A simple enumeration of all possible conditions, groupings, modes of succession, combinations, and absence or association of symptoms, would give a much less satisfactory idea of the clinical history than if we picture to ourselves the development and course, in short, the whole sequence of symptoms of an ulcer set up by one of the most frequent causes, for instance, a varicose state of the veins of the leg.

Development and Course.

An individual who has become affected with varicose veins at an early period of life, one who has acquired them from some manifest cause in one or both lower extremities—a baker's, joiner's, or turner's lad, a shop-boy or waiter, who day by day must stand on his legs and fetch and carry for many hours; a female who, under similar circumstances, or after pregnancy, has dilatation of the

veins and as a shopwoman, washerwoman, cook, &c., is also obliged to stand a great deal; in short, any one who is from any cause suffering from varicose veins, will, after the lapse of some years, complain of itching in the skin.

On examination, we shall find, in addition to the varicose veins, smaller and larger excoriations on the lower extremities, isolated papules, pustules, crusts, streaks and spots of pigment, here and there; in short, all the symptoms of moderate eczema artificiale e pruritu cutaneo.

Itching is the first cutaneous symptom set up by the varicose state of the veins. The appearances above mentioned are only the secondary results of the itching and the direct consequences of scratching.[1]

In addition, however, we soon find spots resembling flea-bites, or somewhat larger, of the size of pins' heads or lentils, of a bluish-red colour, and which do not disappear under pressure with the finger—hæmorrhages.

These are placed quite irregularly here and there, or in many places occupying the situations of the hair follicles, which are enlarged and form elevated papules surrounded by a hæmorrhagic zone—lichen lividus.

These papules may also, in places, present the appearance of having been scratched, being covered with a blood-crust or converted into a pustule with bloody, purulent contents, and surrounded by a broad zone of inflammation.

The rest of the skin, which is free from hæmorrhages and eruption, is quite normal in appearance and consistence.

These symptoms persist for many months or several years.

The more the patient is able to take proper care, that is, the less the impediment to the circulation in the veins is aggravated by standing, walking, &c., the less marked and the more transitory are the symptoms. The eruption disappears, the excoriations heal, and the hæmorrhages become absorbed.

In the same degree, however, as the reverse is the case, that is,

[1] As Hebra has had various opportunities of assuring himself, a slight irritation of the skin, frequently repeated, causes a tickling sensation and then itching. In the cases under consideration, the irritation seems to be afforded by the slow course, here and there almost stagnation, of the blood in the smallest veins and capillaries. It is certain that the first symptom of all presented by patients affected with varices consists in itching and its consequences, the results of scratching.

when conditions which maintain and increase the venous stasis persist, will the symptoms above mentioned and their consequences also increase in number and severity.

In the first place, somewhat deeper excoriations make their appearance here and there, and larger pustules, with more copious purulent secretion, and, as a consequence, destruction of the uppermost papillary layer and the formation of more intense and extensive zones of inflammation. The sores thus produced heal more slowly, or the regeneration of tissue and of epidermis is interfered with by fresh hæmorrhages occurring from time to time. In this way, there results, in places, a loss of substance which, though quite superficial, persists for a much longer time than would be expected from its size and depth.

If the extremity is kept at rest, a cure follows very quickly. Just as quickly, however, under opposite conditions, may the delicate epidermis of a freshly formed scar be raised into a hæmorrhagic bleb, the superficial layers of the epidermis being infiltrated with blood and shed by molecular disintegration under the influence of suppuration and repeated extravasations. The series of symptoms is repeated over and over again; the formation of crusts, retention of pus, formation of inflammatory halos, frequent interruptions in the formation of granulations, &c. &c., till at last, probably, cicatrisation again ensues.

As, however, the causes leading to the destruction of tissue, the stagnation of the circulation, the excoriations, the hæmorrhages, persist, with aggravations from time to time, permanent and deeper losses of substance are produced, here and there, in the manner described above, and with a tendency to continuous disintegration of tissue preponderating over that to cicatrisation. A chronic ulcer of the leg—ulcus cruris, ulcus e varicibus, or ulcus varicosum, wrongly so called—has become permanently established.

In the course of years, under the influence of these constantly changing inflammatory and destructive processes, the leg will have become completely altered in appearance. The portions of skin surrounding the individual, scattered, inflammatory and suppurating centres have been repeatedly attacked by a complication of inflammatory processes, at one time occurring in a discrete form and localised around the ulcers, pustules, and extravasations and, at another, in the form of a diffuse dermatitis spreading over large tracts of skin, or in the form of a lymphangitis spreading in streaks.

All these secondary inflammatory processes aggravate, for the time, the local exudation and the congestion, and are themselves, again, causes leading to the destruction of the scarcely reproduced young tissue, that is, of the granulations and cicatrices. They are, therefore, a source of ulceration, at the same time that, originally, they resulted from it.

Finally, these attacks of inflammation, occurring repeatedly for years, lead to permanent dilatation of capillaries and œdema, conditions which in course of time result in hyperplasia and degeneration of the connective tissue, and, later, of the muscles and bones; in short, an elephantoid thickening and degeneration of the leg, such as we have described in detail at p. 135, vol. iii.

Such a condition of the skin predisposes in a high degree, *per se*, to renewed attacks of inflammation on the slightest provocation. And, since the inflammation again tends to maintain and increase the ulceration, we have here an endless circulus vitiosus.

Commencing with very insignificant appearances, the malady in the course of ten or twenty years will have developed into an exceedingly complex group of symptoms, of which the more or less extensive ulcus cruris, though possibly not always the most important, will, at any rate, be the most striking and well-marked morbid phenomenon.

Starting from the spine of the tibia, the leg will be seen to be enlarged, the skin mottled with bluish-red or brownish-red streaks, glistening, smooth, or in places covered with thin, dirty-white scales, and in others with thick, dirty-brown, fatty, shield-like masses of epidermis and sebaceous matter much fissured. Here and there, are scars of a white colour or surrounded with a pigmented margin. The rest of the skin is thin in parts, tense over the crest of the tibia, and only to be pinched up with difficulty, or, on other parts, especially over the malleoli, it is thickened and smooth or covered with warty excrescences (elephantiasis papillaris). In the midst of this area, there will be a single ulcer or several isolated or confluent ones, of unequal depth and with sinuous, callous, immovable borders, the base being smooth or pitted and covered with disintegrating, red, or hæmorrhagic granulations, and secreting a thin, viscid, badly smelling discharge, owing to want of proper cleansing.

The ulcers, not unfrequently, are of considerable size. They sometimes measure several inches in breadth, and surround the circumference of the leg in a band for two thirds of its extent. They

are almost always situated in the lower third of the leg and on the anterior surface, owing, no doubt, to the scarcity of subcutaneous cellular tissue at this part, and to pressure caused by the projection of the crest of the tibia,

Ulcers of the leg are not particularly painful as a rule, and, at any rate, only at particular points which have been temporarily irritated by stretching, the forcible removal of dressings, &c.

Their bad effects are purely local. They impede the usefulness of the extremity in proportion to their severity, and may lead, but only occasionally, to lymphangitis, enlargement of glands, erysipelas, and fever.

It is not merely for the purpose of practical instruction that we have so minutely traced the development and progress of ulcers of the leg, by means of a special example, from its earliest commencement to the full development of the process. We also intended to show the reader that it merely required a careful review of the actual phenomena to arrive at the conclusion that the development of the so-called ulcer of the leg can be followed, step for step, from the changes set up by the inflammation of the skin, the inflammation itself, however, being caused by local agencies.

Directly opposed to this connection, however, we have all the prejudices and false, unscientifie, and in part actually absurd, ideas which have been so unduly entertained by laymen and physicians in regard to ulcers of the leg. The conviction arrived at by direct observation, as seen above, that the ulcers under consideration are neither more nor less than the outcome of tissue changes set up and maintained by local inflammation—this conviction is, once for all, wholly incompatible with the unjustifiable notions that ulcers of the leg represent a kind of vicarious secreting organ, whose secretion must not be checked for fear of setting up some serious mischief in internal organs; that ulcers of the leg must not be healed, or, at any rate, only with great caution; that making an issue in the arm affords an outlet for substances which otherwise escape by the ulcer of the leg, &c. &c.

On the contrary, we look on an ulcer of the leg as a loss of substance due to inflammatory disintegration of tissue, and of the same significance as any other tissue disturbance set up in any other way, or any part of the body, as a bodily ill, which must be cured as quickly and as soundly as possible.

The cessation of a continual drain on the system caused by con-

stant suppuration and the restoration to usefulness of a disabled extremity, which are the results of effecting a cure, can hardly be regarded in the light of disadvantages.

Special Etiology.

As we have already discussed the general etiology of ulcers (page 5), and have also just dealt specially with one of the most frequent causes of ulcers of the leg, it will suffice here to mention, in a general way, that all external and local causes which are competent to set up chronic, recurrent, inflammatory processes, exudation, and extravasations on the lower extremities, also act, directly or indirectly, as causes of ulcers of the leg. Thus, at one time, varicosity of the veins, at another, a chronic eczema, which probably had an artificial origin, may afford the starting point for the series of phenomena described above; or excoriations resulting from the presence of parasites, pressure from some article of clothing, an injury to the skin over the shin bone, &c. &c. At a later stage, the number of possible sources of aggravation increases in proportion as the impediment to the circulation and the inflammation are more easily increased. Irritating (resinous) plaster (emplastrum oxycrocei, ad rupturas, e gummi ammoniaco, turpentine plaster), constricting dressings, too much standing or walking, retention of secretions under crusts, &c., then act in exciting fresh extravasations and destruction of tissue. Induration of the margins of the ulcer, due to its long duration, impeding the traction of the adjacent skin necessary for the diminution of the loss of substance; the constriction of the afferent vessels by the shrinking of the scar; the large size or the inconvenient shape of the ulcer itself, may all act as hindrances to healing, and, therefore, indirectly, as causes of the persistence or increase of the ulceration.

As so many of the causes of ulcers of the leg act from without, it will be evident that the external conditions of the manner of living, the occupation, and the social position exercise a material influence on the production of ulcers of the leg.

They occur by far most commonly amongst artisans and labourers who have to stand a great deal and who cannot rest when the first sores appear. In such persons, varices easily become developed, or repeated disturbances occur in the process of healing even of the slightest wounds. Amongst the well-to-do classes, cases of ulcer of the leg are much less frequent. Though varices occur

commonly enough, the ill-effects of the disturbance of the circulation are nullified by proper care. Not unfrequently, even among them, however, injudicious behaviour, and, especially, improper treatment, afford opportunity for the production and extension of ulcers of the leg.

Diagnosis.

If we devote a few words to the diagnosis of ulcers of the leg, it will not be simply with the object of bringing forward any fresh aids to the diagnosis of ulcers resulting from chronic inflammation. The characters mentioned above must, indeed, suffice. I will rather call attention to the fact, taught by practical experience, that difficulties often arise in the differential diagnosis between these inflammatory, or so-called simple ulcers and syphilitic ones, *i.e.* ulcers resulting from gummata. At one time, a circular shape, at another, the margin infiltrated with inflammatory products or elevated like a rampart, firm and callous, or the fatty discoloured material on the surface of the ulcer may cause the simple ulcer to resemble a syphilitic one, or, *vice versa*, a syphilitic ulcer may be mistaken for a simple one. A careful consideration of the signs of the two kinds of ulcers and a resort to physical methods of examination will prevent any such confusion. In order, however, to avoid repetition, I must here content myself, on the one hand, with pointing to the characters of the inflammatory ulcers above enumerated, and, on the other, with referring to a subsequent chapter, in which we shall specify those of the syphilitic ulcer.

So, also, as regards the differential diagnosis between the inflammatory ulcers of the leg and those due to lupus, we shall, here, content ourselves with referring to the account of the latter given at page 88, vol. iv.

Treatment.

From the present standpoint of pathology, it is hardly worth while to enumerate, here, the various views held by the older surgeons in regard to the treatment of ulcers of the leg, and which were occasionally attacked and defended both by writing and orally with a perseverance and energy worthy of a better cause. A sufficiently good idea of this kind of contest is afforded by the controversial writings of Kern, on the one side, and Rust, on the other, during the early part of the present century.[1]

[1] Rust, 'Helkologie,' Wien, 1811, Bd. i, p 68.

For ourselves, as we cannot see in ulcers of the leg and their products any specific diseases or any necessary additions to the organism, but only products of tissue necrosis originated and maintained by inflammation, and regard them as a highly superfluous addition to the organism, we shall only be guided in the treatment of ulcers of the leg by considerations founded on a review of these local disturbances of nutrition and the existing causes of the same. We at once discard the idea of troubling to seek for a specific cure for ulcers of the leg and the advantage of being able to recommend such.

Our remedies and methods of cure for ulcers of the leg are simply those furnished by general therapeutics, and the objects in view are—(1) to check or moderate the inflammation and its effects (extravasations, disintegration of tissue, suppuration); (2) to hasten the separation of the necrosed tissue; and (3) to accelerate the formation of granulations and cicatrisation and to remove all hindrances to the latter.

Ad. 1. Here must be mentioned the remedies and methods by which we can combat the origin, extension, persistence, severity, and recurrence of circumscribed and diffuse inflammation. In the first place, as palliatives we have all those remedies which will bring about a cure as quickly and completely as possible during the stage of the formation of disseminated pustules and furuncles, and of commencing eczematous and inflammatory symptoms. They are the more efficacious as preventives of the formation of ulcers of the leg, the earlier and the more persistently they are employed.

In this respect, too, negative therapeutics must not be disregarded, inasmuch as we must carefully abstain from the use of irritating plasters and salves, and, in fact, from anything that will irritate the skin.

As special antiphlogistics, the application of cold (ice) and the maintenance of the limb in a horizontal posture will be found efficacious under all circumstances and as often as the inflammation increases afresh. The local abstraction of blood by means of leeches and cupping-glasses seems to us no more advisable, either for practical or theoretical reasons, than the so-called derivation to remote parts of the body by means of blisters, issues, setons, &c.

The methodical application of flannel or calico bandages forms one of the most efficient remedies[1] against the most freqnent and

[1] I here speak of the methods which combat the local disturbance of the circulation caused by the varices, *i. e.* which favour the return of the blood.

important cause of ulcers of the leg, *i. e.* a varicose state of the veins, which repeatedly gives rise to inflammation, extravasations into the healthy skin or the granulations, &c.; in short, to disturbances of the circulation.

For the leg of an adult, we use a bandage ten yards in length. Its application is commenced by a turn immediately behind the toes, and is continued in figures of 8 upwards around the ankle, and, then, in a slightly ascending spiral, up the leg above the calf, the turns being almost parallel and covering one another, except for about a finger's breadth, and the bandage being drawn moderately tight. The end is either tucked under the last turns or fastened by means of a safety pin. Elastic or other bands are unsuitable for fastening the bandage, because they exercise constriction.

Indication for the application of this compressive bandage is afforded, under all circumstances, as soon as a varicose state of the veins exists,[1] whether in the stage of itching, excoriations, and pain from prolonged standing and walking, or after the healing of an ulcer which had been present, or, lastly, during the existence of the ulcer and the stage of granulations.

In the latter case, the bandage will exercise a direct beneficial compression on the freshly formed vessels and granulations, and will tend to prevent their being destroyed anew and the occurrence of extravasations. Œdematous granulations, and such as are not in a favorable condition for cicatrisation, are freed from their superfluous serum by the compression, and become converted into

The plans of cure which aim at removing the varices themselves, for instance, by obliterating the varicose veins, do not come within the scope of this work, but belong to the domain of special surgery. I will, however, allude to the at all events noteworthy method of cure proposed by Rigaud, by which he has been successful in many cases in causing the obliteration of varices by merely isolating and laying bare the veins involved. (See Bergeron, "Traitement curatif des varices superficielles des membres et de la cirsoide par le simple isolement des veines," 'La France Médicale,' 1875, quoted in "Centralbl. für Chirurgie," 1875, No. 46). It must not be concealed, however, that the exposure of the veins is always attended with danger and in not a few cases has led to the death of the patient, owing to phlebitis, thrombosis, or embolism.

[1] In many cases in which persons have complained of severe "gouty" pains increasing towards evening, in the neighbourhood of the ankle, sole of the foot, and heel, and where, on examination, I have found varicose veins, I have been fortunate enough to remove the pains by the mere application of this compressive bandage.

firm, resistant structures, capable of undergoing permanent organisation.[1]

The ordinary simple or paste compressive bandage also possesses this advantage, which, considering the long duration of the malady we have to deal with, can scarcely be overrated, that the patient, except during attacks of severe acute inflammation, is able to follow his occupation with comfort.

As palliatives, or as adjuncts to the direct treatment of the ulcer, we may find the remedies useful which are efficacious in chronic eczema of the leg (see vol. ii, p. 162, &c.).

Ad. 2. The remedies and methods of procedure by which the removal of the necrosed portions of tissue from the ulcer may be hastened, the destruction of tissue checked, and the ulcerating surface converted into a granulating one, are extraordinarily numerous and various. It is obvious that those mentioned under *Ad.* 1, rest, antiphlogistics, and the compressive bandage, as they remove or prevent the immediate causes of the formation of the ulceration, the inflammation, and extravasation, also belong to this category.

In addition, there are a multitude of therapeutic remedies at command, from which sometimes one and sometimes another may be selected, according to individual experience.

The so-called antiseptics are particularly in repute—Carbo ligni tiliæ pulverisata, gypsum bituminatum (gypsum, in powder, and bitumen fagi, the latter being gradually added, are rubbed up in a

[1] We may also mention here the use of an elastic bandage as recommended by Dr. Martin, of Boston ("The India-rubber Bandage for Ulcers and other Diseases of the Legs," by Henry A. Martin, M.D., Boston, U.S.A., 'Brit. Med. Journal,' Oct. 26th, 1878, and separate pamphlet).

The bandage should be about four yards long for an average leg, but the length will vary in different cases. It should be about three inches wide. No dressing need be placed between it and the skin or surface of an ulcer. No doubling on itself is required. It should be kept on the stretch as it is applied and wound round smoothly. The pressure exercised may be light at first and increased after awhile as the patient becomes used to it. The bandage is taken off at night, washed, and hung up to dry. Any wound present may be dressed during the night with ointment, &c., which should be cleaned off in the morning before the bandage is reapplied. In the treatment of varicose veins, eczema of the leg, ulcers, &c., the support given by the india rubber seems most beneficial. Ulcers can thus be cured while patients are still walking about and following their occupations. Those using the bandages speak most strongly of the comfort and support given at the end of a long day's work. Various instrument makers now supply them at a reasonable cost.—(Tr.)

mortar, a powder of a chocolate colour being produced), carbolic-oil dressing, (acid. carbolici, drachmam ad olei olivar., drachm. sex); Lister's dressing, the latter in combination with a paste (acid. carbol., unciam semis, olei olivar., unc. tres, cret. alb. pulv., quant. sat. ut f. pasta), spread on tinfoil, with which the wound is covered (a layer of charpie dipped in oil having been first of all applied). This kind of dressing has of late been modified in various ways by surgeons. It is of very great value, but it is not any more infallible than many other remedies.

Amongst these, we must especially note the plan of continual bathing with water, on account of its simplicity, convenience, and cheapness. Kern pleaded strongly on behalf of the superiority of the constant application of warm water over the complicated methods of treatment in use until his time. The "simple" method was not then by any means new. Kern, however, strongly advocated its persistent employment, and raised up a lively contest.

To us, without any bias to either side, it would seem that both he and his opponents were to a certain extent right. Kern was in the right so far as this, that the application of water, alone, is a very efficient mode of treatment; and his opponents were right, inasmuch as the treatment is not successful in all cases.

It is quite possible to use the fomentation, even while the patient is going about, by applying some waterproof material (gutta-percha tissue) over moistened lint placed next the wound, and then covering the whole with a compressive bandage.

This is the place to point out that Hebra's continual bath is a more effectual plan than the ordinary method of applying fomentation, especially in intractable ulcers attended by deep destruction of tissue and spreading widely.

Originally employed by Hebra for cases in which a loss of epidermis over extensive tracts of the body necessitated some general, unirritating and protective covering for the exposed papillary layer (for instance, in scalds, burns, pemphigus, &c.), the continual bath has come into use in the dermatological clinique and department here, in the course of years (at first occasionally, but of late systematically), in cases in which, owing to extensive sloughing of cellular tissue or numerous ulcerations, offensive discharges, and difficulty of maintaining cleanliness, patients have been a source of great annoyance and danger to their ward mates.

These latter classes of cases have, during the last few years,

afforded us much important evidence in favour of the employment of the treatment by the continual bath. The rapid success attending the use of the continual bath in such cases was quickly acknowledged in the surgical and other departments of the general hospital. From each of these departments, patients with sloughing buboes, bed sores from typhus, anus præternaturalis, callous and sloughing ulcers, and similar conditions, were referred to the dermatological department for the purpose of trying the effect of the continual bath. It is absolutely wonderful within how short a time the beneficial effects of this plan may be apparent. At the end of the first day, or from that to three days, or even within a few hours, the most severe phlegmonous inflammation of the skin is checked, the redness, swelling, and painfulness of the skin surrounding the sloughing parts diminish, the fever abates, the dryness of the tongue disappears, sleep and appetite return. At the same time, the necrosed tissue begins to loosen and separate. A rapid, luxuriant, sometimes even an excessive formation of granulations[1] follows, requiring, in the latter case, the application of the usual caustics to make them shrivel up, and at length, while the bath is still continued without intermission, complete cicatrisation occurs.

If we add to these facts the further advantages that, as soon as the bath is commenced, dirty and sloughing wounds lose the offen-

[1] Stricker states ('Lehre von den Geweben,' Leipzig, 1868, p. 17) that many amœboid (young) cells burst when acted on by water, and therefore perish, and some years ago estimated the destroying influence of water on young tissue elements, as it seemed to me, even still higher. This applies, however, only to cells detached from the organism and observed under the artificial conditions of the table of the microscope. Clinical experience, as it would seem, has taught us that the formation of granulations while constantly exposed to the influence of the water bath may, on the contrary, not only be very luxuriant, but even too much so for the purpose of cicatrisation, and that the epidermic covering is completely regenerated without any difficulty.

At the 48th meeting of German naturalists and physicians at Graz, in 1875, Dr. Nitsche (see 'Tagbl. der 48 Versammlung deutscher Naturforscher und Aerzte,' p. 162) spoke "decisively against the continual immersion plan," because it was eminently calculated to lead to "the formation of swarms of bacteria" and the "decomposition of pus." The facts we have quoted above in reference to the truly brilliant results obtained with the continual bath in the healing of wounds, ulcers, and gangrene (such as in eschars from burns), render it unnecessary for us to consider in detail Nitsche's by no means profound treatise. Nitsche himself admits that persons suffering from "burns at the earliest stage, before suppuration has commenced, experience a great sense of 'comfort' when in the bath."

sive odour which otherwise poisons the atmosphere of the ward, that a spontaneous constant cleansing occurs, that the water bath does away with the necessity of spending labour and money in the ordinary means for purifying the wounds, that the patients when in the bath soon lose their pain, previously so severe, and, indeed, feel very comfortable, we cannot too warmly espouse following these indications of a wide-spread usefulness of the continual bath.

In chronic ulcers of the leg, as a rule, we have no separation of such large masses of necrosed tissue as in gangrene, but merely thin, superficial layers. Continual fomentation, however, acts just as well in the one case as in the other, and leads to such a change in the condition of the tissue as predisposes it to a healthy and active formation of granulations. Its action is especially evident on the indurated margins, and hard, sclerosed granulations of old, sluggish ulcers, which under this treatment become soft, movable, and well adapted for cicatrisation and diminution of the wound (by contraction).

In addition to the mechanical, antiseptic, and hygro-tepid remedies mentioned, there are also others to be recommended in certain circumstances, which dissolve pus and act as slight caustics and irritants, and are used as lotions, salves or plasters; for instance, caustic Potash, 1—2 grs. to the ounce of distilled water; Cupri Sulph., 1—2 grs. to the ounce of water; Hyd. Precip. Rub., 2—5 grs. to half an ounce of Ung. Simpl.; Cupri Acet., 1—2 grs. to two drachms of lard.

Or, we resort to active cauterisation, by which the whole of the necrosed layer on the surface and the margin is at once destroyed to the level of the normal soft tissue but little infiltrated with products of inflammation. The eschar so formed separates in a few days and leaves behind a normally granulating wound, which rapidly tends to heal.

The most convenient for this purpose is Potassa Fusa—in stick—or in the form of Vienna paste (see "Caustics," p. 101, vol. iv).

Ad. 3. If we have succeeded by the aid of any of the above means, in converting the ulcer into a granulating wound, the simplest treatment is often sufficient, and the healing proceeds uninterruptedly.

Not unfrequently, however, it is delayed from this stage onwards exceedingly tediously and for various reasons. At one time, on account of some abnormal torpidity, hyperalgesia, dropsy, or fungoid

or hæmorrhagic state of the granulations, or on account of callosity, rigid fixation, deficient gliding of the margins and their surroundings, &c. Under such circumstances we must employ the partly stimulating and partly caustic dressings and manipulations formerly treated of at p. 314, vol. iii, where, indeed, the details are given of indications for special use.

We will here only allude, particularly, to the application of local compression by means of strips of plaster, a method of treatment introduced by Thomas Baynton, improved by Theden, and imported into Germany by Dr. Völzeke.[1] The strips of plaster are applied *secundum artem* from below upwards with the ends crossing. The whole or nearly the whole extent of the leg is covered and the strips come into direct contact with the ulcer. The strips must be renewed at the end of the first day or from that to three days, according to the quantity and state of the discharge. Besides the good influence of general compression on the circulation in the veins, by means of a roller bandage, before mentioned, the local compression also induces consolidation of dropsical and shrinking of exuberant granulations, softening of callous margins, and, at the same time, by mechanically drawing the soft parts together the margins of the wound are approximated. The great advantage socially of this plan, that the patient can get about during the progress of the treatment, can scarcely be overrated.

In spite of the multiplicity of the remedies and plans at our command we are not unfrequently unable to effect a cure, especially if the size of the ulcer and the induration of the margin are considerable.

The chief impediment to healing under such circumstances, in addition to the scanty and insufficient formation of granulations, lies in the fact that in proportion as cicatrisation advances from the margin (and it does so very slowly) the marginal cicatricial tissue grows old, shrinks, and compresses the afferent vessels. As a result, the cicatricial tissue perishes in streaks, or extravasation takes place into the scar, or granulations, and the surface of the ulcer repeatedly enlarges again and again.

In such cases where the above-mentioned remedies, including the use of the compressive bandage, have been ineffectual, the indurated

[1] Wienhold, 'Die Kunst veraltete Hautgeschwüre, besonders die Sogenannten Salzflüsse, nach einer neuen Methode sicher und schnell zu heilen,' 2 Aufl., Dresden, 1870, p. 52.

margins have been excised all round by means of the scissors or a knife, or an incision has been made at some distance from the margin around the ulcer, so as to make the peripheral portions more moveable.[1]

The transplantation of small portions of skin, according to Reverdin's plan, described in detail at page 316, vol. iii, and which we, as well as others, have frequently practised with success, may be strongly recommended in such cases.

(2) *Symptomatic Non-contagious (inflammatory) Ulcers.*

In the same way that ulceration may occur in the products of idiopathic inflammation, so, also, ulcers may result from those forms of inflammation which are the expression, or the consequence of a special dyscrasia or a special state of the general nutrition. Under this head, we group the cutaneous ulcers due to anæmia, scurvy, or scrofula, and, possibly, also, a certain number of the so-called leprous ulcers, that is, those occurring on portions of skin which are not the seat of a leprous new growth (tubercular or diffuse cell infiltration), but are affected by acute or chronic inflammation, or, simply, by the local capillary stasis set up by the dyscrasia or abnormal innervation.

Such ulcers as these, just as any others due to inflammation, may, in respect to the physical condition of the surface and margin and of the granulations and their progress, present all the characters described above. Nevertheless, we must not forget that there are certain distinguishing features, which they may exhibit, which will, to some extent, reveal their intimate connection with a particular dyscrasia.

As we have already, at p. 421, vol. i, treated in detail of scorbutic ulcers, and at p. 146, vol. iv, of leprous ulcers, we need here only consider the so-called scrofulous ulcers.

They are developed, as a rule, in the skin over lymphatic glands which have previously been the seat of infarction and disintegration, in the furrow beneath the jaw, for instance; or over lymphatics which

[1] Whether this plan, which is by no means new, though of late brought forward by Nussbaum as if it were so, acts, as he believes, owing to the circumcision of the margins cutting across the afferent vessels, and thus, as a consequence of the diminished supply of blood, the causes leading to the inflammation and destruction of tissue are in great part removed, I do not pretend to say. ('Wr. med. Presse Jahrg.,' 1874.)

are thickened and in a state of chronic inflammation; or over the seat of a chronic periostitis, osteitis, or caries, and are distinguished by their indolent and undermined margins, the atony of their granulations, the thin creamy secretion, and the slowness with which they heal. They are too well known in general surgery to require any further description.

We need only remark that ulcers presenting these characters are not by any means necessarily an indication of the existence of scrofula,[1] as they may develop under any circumstances over lymphatic glands which are the seat of chronic infarction and suppuration. Such glands, moreover, may be found in any case where chronic inflammatory processes occur. For instance, the lymphatic glands of the neck may enlarge and undergo cheesy degeneration in consequence of chronic eczema of the scalp resulting from pediculi capitis,[2] and ulcers may develop under such circumstances having all the characters of the so-called scrofulous ulcers.

Their treatment will be in accordance with the general scheme given in detail above, under the head of varicose ulcers. We shall have, however, to resort more frequently to energetic treatment with the knife and caustics (potash in stick being the best), as, in fact, seems indicated, *à priori*, by the sinuous condition and great undermining of the margins, and the cheesy degeneration and disintegration of the infiltration in the glands.

If we are able to commence treatment at an early stage of the chronic inflammation of the glands, when the skin is merely adherent at the centre, bluish-red and very little thinned, and the glands themselves are still firm, or but slightly elastic to the touch, we may occasionally succeed in effecting absorption of the exudation effused into the tissue of the glands, and avoid ulceration, by the use of cold, and, subsequently, of tepid applications, cataplasms of cod-liver oil, painting with glycerine of iodine or tincture of iodine, or the application of mercurial plaster, alone, or combined with soap-, or mellilot-plaster.

[1] See under the head of "Scrofula," p. 82, vol. ii.

[2] I will not here attempt to explain how far chronically inflamed glands, after they have persisted for a long time, may induce scrofula secondarily, by influencing the quantitative and qualitative conditions of the morphological constituents of the blood.

(*b*). ULCERS DUE TO SPECIFIC INFLAMMATION. CONTAGIOUS INFLAMMATORY ULCERS.

As already mentioned at page 20, there are certain forms of inflammation which, of necessity, lead to ulceration, because the specific character of the agent exciting the inflammation is shown, amongst other things, by the fact that the tissue affected undergoes a typical, progressive, molecular disintegration. We may, therefore designate ulcers arising in this way as specific.

The specific agent which habitually excites an inflammation leading rapidly to typical ulceration is known by the name of syphilitic contagium. The ulcers which develop at the very part where the inoculation occurs may be called idiopathic syphilitic ulcers, to distinguish them from those others which, though also arising in consequence of the syphilitic contagium, do not do so from its direct transference, but as the outcome and symptoms of the syphilitic infection, and do not result from inflammation, but from local new growth, and will be described in a subsequent chapter as symptomatic syphilitic ulcers.

The former ones, the idiopathic specific ulcers, primarily proceeding from inflammation, are known more precisely as chancres.

CHANCRES.[1]

In spite of the generally recognised, specific character of the ulcers called "chancres," we are unable, up to the present time, to give a completely satisfactory definition of them.

It is, however, in a general way, quite correct to say—

A chancre is an ulcer of the skin or of the mucous membrane, originating in consequence of, and at the seat of the direct inoculation of the specific contagium, and is attended by a discharge which, when inoculated, gives rise to an ulcer of precisely the same character as that of the original source of infection.

[1] See Kaposi: 'Die Syphilis der Haut und der angrenzenden Schleimhäute,' 76 chromo-lithographirten Tafeln, Wien, Braumüller, 1875, p. 27, *et. seq.*

From this it follows that chancres must be what are otherwise known as *primary* syphilitic affections. Ulcers which are the outcome of an already existing, general syphilitic infection, and which are also indiscriminately said to be chancres ("chancre of the tonsil," "chancre of the throat," &c), should, therefore, no longer be so named, in order to avoid increasing the difficulties of the subject.

But, over and above this one point, the insufficiency of the definition of a chancre above given is evident in a whole series of cases.

Not unfrequently, ulceration is wanting in an affection which, according to customary and well-grounded clinical ideas, would nevertheless be regarded as a chancre. Or it is so ill-marked, in comparison with other symptoms, that the latter would be selected as the characteristic features of the chancre.

This is evident from the circumstance that, in course of time, as many varieties of chancre were described as there were varieties in the external appearances of the local affection resulting from direct contagion. Thus, first of all, we had soft and hard chancres, then phagedænic, diphtheritic, serpiginous, follicular, and many other kinds of chancre.

The property of contagiousness itself, in the great majority of chancres, doubtless, either demonstrated or demonstrable, has given rise to distinctions between chancres according to the modification presented. Some chancres were found to be inoculable under all circumstances, or almost without exception, whilst others were only inoculable under certain circumstances and only in particular persons; so that the property of contagiousness will not by any means, alone, or generally, but only with certain restrictions, avail for the differential diagnosis of chancres.

The complication of a chancre with certain processes which, on account of their nature and their typical recurrence, must be considered to have some intimate connection with the chancre, has also seemed to characterise the nature of the chancre itself (chancre with suppurating buboes, chancre with indolent buboes).

Lastly, the varying relationship to a subsequent, specific, general affection has, on all sides, tempted men to use it as a basis for a scientific and clinical classification of chancres. Some supposed that such a relationship existed in all cases (unicists); others that only one form, the hard chancre, was liable to be followed by any

constitutional affection (the French dualists); whilst others denied it once for all (the German dualists).

Such different views do not admit of being combined in one harmonious whole, in the narrow compass of a definition which will include all cases.

Nevertheless, it would be wrong to overlook the fact that a mutual reconciliation is not only possible, but has at all times been effected. In one direction and in one point, these views, which are otherwise so very divergent, become again convergent; the point from which they originally started, the basis of clinical experience.

Symptomatology.

From the earliest stage of their development, and increasingly from thence onwards, throughout the whole of their existence and progress, they exhibit very great variety in their symptoms.

Clinically, however, a certain number of these symptoms recur with preponderating frequency and great regularity. These may, therefore, be regarded to some extent as typical of the character of the chancre.

Development.

Whenever a fresh chancre is produced by artificial inoculation of the specific material under the epidermis (with a lancet), we have an opportunity of studying the first symptoms of its development.

Around the point of inoculation, a red zone of congestion forms, even within a few hours, and in its centre, in the course of from twenty-four to seventy-two hours, a vesication with opaque contents, a pustule, becomes developed.

A similar initial efflorescence may be observed when the secretion from a chancre, constantly brought in contact with adjacent portions of skin, becomes inoculated there, after maceration of the epidermis, or by penetrating into a hair follicle—auto-inoculation.

After from three to five days, and when the pustule has attained a degree of development varying in different cases, its roof is removed by bursting, or in consequence of mechanical injury, and the chancre is exposed as an ulcer, with a characteristic appearance.

The ulcer in this typical form represents a more or less deep loss

of substance of the corium, or of the mucous membrane, of a circular form, looking as if punched out, or bored with an augur, having sharply-cut, but slightly indented edges, looking as if they had been gnawed, somewhat undermined, and projecting slightly above the level of the surrounding parts. The margins, as well as the unequally pitted surface of the ulcer, are covered with an adherent, greyish-yellow layer, and bleed easily when any attempt is made to remove this layer.

The base of the ulcer and the surrounding parts, covered by congested and swollen skin, feel moderately soft, or, at any rate, only slightly indurated, just, in fact, as the cellular tissue does when inflamed from any other cause, and they are painful on pressure.

The surface and margins of the ulcer secrete a copious, seropurulent fluid.

The latter is highly contagious.

When inserted beneath the epidermis, or when it penetrates into a follicle, or reaches the surface of a wound, the secretion gives rise to an ulcer of precisely the same appearance, and with a secretion of the same contagious character evinced by the parent ulcer, whether the inoculation occurs in the same individual or in any person selected arbitrarily, syphilitic or non-syphilitic.

Even as regards the symptoms belonging to this first stage of development, the chancre frequently shows considerable departures from the normal type, of which a short sketch has been given.

The initial pustule is absent when the specific contagium comes in contact with a previously existing wound, for instance, one resulting from circumcision; or penetrates into a follicle. In the former case, the whole wound at once takes on the clinical characters of a chancre, *i. e.* appears to be converted into a fully-developed chancre. In the second case, an inflammatory swelling of the follicle, in the form of an acne-like tubercle, is the first effect, and a somewhat crater-like ulcer, which presents the general characters of a chancre, developes subsequently; or the follicle may be at once converted into a cæcal canal, whose margins, walls, and base are chancrous—a follicular chancre.

The chancres, even at this period, differ essentially from one another in form. As has just been indicated, chancres which have been developed in follicles, in contrast to the normal type of rather superficial ulcers, are characterised by greater depth than breadth, by having an almost canalicular appearance; and, in the same way,

chancres originating in wounds, rhagades, and excoriations, take, from the commencement, the form and extension of the latter, and may, therefore, be either shallow and extensive, or gutter-like.

Course.

The greatest and most essential differences, however, become evident in the course of their further progress, not only in regard to appearance, secretion, contagiousness, and consistence, but, still more so, in regard to the local and remote consequences and complications, and, especially, in regard to a possible infection of the general organism.

From this point of view, in order to designate different modes of progress, we are not only fully justified, clinically, in making several varieties of chancre, but such distinctions are exceedingly useful in practice.

Two of these forms of chancre, on account of their comparatively frequent occurrence, and the exceedingly well-marked character of their different types, have, from a very early period, been distinguished from the rest, and, according to the symptom by which they are most markedly separated from one another, the difference in the consistence of the affected tissue, have been designated as *soft* and *hard* chancres. There are others which, as regards consistence, cannot be well separated, either from the hard chancre, on the one hand, or from the soft, on the other, occupying a kind of intermediate position between the two, but which, nevertheless, appear to be special forms of chancre clinically, owing to other striking peculiarities presented by them.

THE SOFT CHANCRE

(*The Simple Chancre, the Venereal Contagious Ulcer; Chancre mou, Chancre simple; der weiche Schanker, einfacher Schanker, das venerisch-contagiöse Geschwür*).

By "soft chancre" we mean a chancrous ulcer which, for a longer or shorter period, essentially retains the characteristic appearance, destructiveness, great contagiousness, and, pre-eminently, the consistence (soft or only an amount of hardness of the margins and base which would correspond to a merely inflammatory induration), common to all such (and described above), and then, after its conversion into a healthy wound, heals, leaving a corresponding white scar.

Ordinary Course of the Soft Chancre.

The chancre, in the form of an ulcer with the characters mentioned and originating in one of the ways described, preserves its specific quality, essentially, for a certain period, which is called the *stadium destructionis* of the chancre. This lasts, on an average, from three to six weeks.

During this period, the chancre increases in size at the expense of the surrounding tissue, and much more superficially than deeply. It rarely, however, becomes larger than a fourpenny-piece. In appearance and to the touch, its surface and base seem the same as before. It alters in shape first of all. It becomes roundish, is irregular instead of quite circular.

The soft chancre is attended by a copious purulent discharge throughout its whole course.

This discharge retains the original peculiarity of being exceedingly contagious, both as regards the individual affected, and also, any other person. At a later stage, therefore, we usually find several soft chancres (multiple soft chancres).

Each freshly-inoculated chancre progresses just as the original one did. It may become the starting-point of a generation of fresh chancres, which may go through the same course as the parent one,

or may differ essentially therefrom, in one of the ways to be subsequently described.

In the course of from three to six weeks, seldom later, the aspect of the chancre changes, for it loses its ulcerating character, and presents the appearance of a normal, granulating wound. At the same time, it passes from the *stadium destructionis* into the *stadium reparationis.*

Coincidently with marked diminution of the inflammation and swelling of the tissues, the painfulness, and the secretion of pus, bright-red points (granulations) make their appearance on the margins and surface, chancrous pits, covered with a layer of pus, still, at first, intervening between them, but they quickly increase in number and size. The margin quickly, therefore, appears smooth and flattened, and the surface becomes elevated, and both are of a bright-red colour; in fact, have the aspect of a granulating wound.

From such a wound, no doubt, pus will still be secreted, but the pus which comes from the chancre during this so-called *stadium reparationis* is no longer contagious.

With the loss of its clinical characters, the chancre has also lost its functional peculiarity, that of contagiousness.

This conversion of the chancre into a normal wound takes place, mostly, at all parts, without known external cause, within a few days.

Occasionally, however, the chancre retains its chancrous condition at a limited part of its periphery, whilst, over the remaining portion, the reparation becomes complete. From such a point, just as from an independent centre of contagion, the ulcerative, specific destruction may still spread for a certain variable time longer.

As a contagious pus is still secreted by this part of the wound, an auto-inoculation, or contagion to another individual is quite possible from a partially healed chancre.

Finally, however, under any circumstances, the transformation into a healthy granulating wound takes place, even on the places freshly attacked.

When the granulations have uniformly filled up the gap formed by the loss of substance, and have reached the level of the adjacent healthy portion of skin, a bluish-white, glistening border of young epidermis advances from the margin, and, gradually approaching the centre, finally completes the cicatrisation.

The cicatrix left after the healing of a soft chancre is soft, remains so, and its size corresponds to the loss of substance.

The time generally occupied by the chancre in passing through the typical course described, and becoming cicatrised over, is about six or eight weeks.

This period applies only to the course of each chancre individually. If, as is frequently the case, several chancres, which have originated at the same time, are present, the period of healing may still remain within the above limits.

If, however, as not unfrequently occurs, during the late stage, fresh chancres appear by auto-inoculation, whilst the pre-existing chancres still remain, the healing may, of course, be considerably protracted, owing to the fact that the later ones also take the period above-named to go through their course.

This evil is, however, remedied to some extent by the fact that the chancres which appear last generally pass through their course rather quicker than the original one.

In a few cases, the repair and cicatrisation of the soft chancre is interrupted in a peculiar, though, as a rule, very transitory manner.

On one, or several, or all of the chancres, the granulations which are to effect the conversion of the chancrous ulcer into a normal wound begin to grow, so as to project above the surrounding level. We then have a red, papillary wound-surface, corresponding in size to the chancre, copiously secreting pus, sharply defined from the adjacent normal skin, and projecting above it.

The pus from this papillary excrescence often remains contagious for a very long time.

We cannot look on this as a proper stage of repair, but, on the contrary, under these circumstances, must consider there is a chancre still present, though in a peculiar form, and must designate it with a special name—*ulcus elevatum.*

The projecting outgrowth of the ulcus elevatum offers a considerable impediment, for a certain time, varying in different cases, to the progress of the border of cicatrix advancing from the margin. Finally, however, the projection subsides and the cicatrisation proceeds without hindrance.

Abnormal Course of the Soft Chancre.

Of much greater importance, however, than the slight departures

from the usual course of the chancre, just described, are those processes which consist in an increase, or qualitative change, in the destructive tendency inherent in the chancre. They not only lead to various essential deviations from the typical aspect of the disease —that is, variations in the chancre itself—but, also induce a series of accessory and complicating appearances which are absent in the common form of the soft chancre, or are very inconspicuous.

Sometimes a widely-spreading gangrene attacks the tissues, instead of the molecular disintegration of tissue peculiar to the soft chancre. The tissues appear converted into a dry, shrivelled mass, friable as tinder, of a dark green colour, and firmly adherent to the subjacent tissue. The depth to which the necrosis penetrates varies. The adjacent tissues show symptoms of the most severe inflammation, considerable and painful swelling, œdema, and intense congestion of the skin.

Simultaneously with the "dry gangrene," we have, also, "moist gangrene." At the margin and the base of the necrosed mass, we find a dirty, yellowish-grey, thin, ichorous fluid, resulting from disintegration of the peripheral tissue.

The type and character of the original chancre is utterly lost in the gangrene spreading on all sides. The ichor from the gangrenous part is not infectious in the sense in which the pus from the chancre is so. The characters presented by the gangrene do not differ in any respect from those of gangrene from any other cause whatever.

It is only out of regard to the fact that the gangrene originated in a typical chancre, that one speaks under such circumstances of a gangrenous chancre—*ulcus gangrænosum*.

In fact, the essential peculiarity of the chancre, its specific contagiousness, is completely lost on the first appearance of the gangrene.

Occasionally, however, the very extensively undermined margin of acutely inflamed skin, surrounding the patch of gangrene, presents the indented, sinuous appearance, and considerable secretion of pus, indicative of the chancrous ulcer.

After the gangrene has produced a destruction of tissue, which varies in different cases, it is arrested in a manner which is well known. The inflammatory symptoms at the circumference diminish greatly, the pus becomes of a normal character, the eschar separates, the formation of healthy granulations rapidly proceeds from the line

of demarcation, and cicatrisation is completed without the characters of a genuine chancre having ever become again manifest.

The diphtheritic form of chancre is related to the one just described. The surface of the ulcer, due to the destructive advance of the soft chancre, becomes covered by a yellowish-white, firmly adherent, tough, membranous layer, which is not sensitive to the touch and secretes a little thin ichor, or is almost dry.

The circumference is only moderately, or not at all, inflamed. The scanty, thin secretion is not inoculable. We do not recognise the ulcer as having originated from a typical chancre.

The ulcer, not unfrequently, remains quiescent in this state for weeks without markedly increasing in circumference and depth.

After a variable period, the inflammatory symptoms at the margin and base become aggravated either spontaneously or in consequence of some severe therapeutic measures. The swelling, painfulness, and secretion of pus increase; by the latter, the diphtheritic layer is lifted off. The formation of granulations and cicatrisation quickly follow, as in a healthy wound.

The serpiginous chancre—*ulcus serpiginosum*—is a rare modification of the soft chancre.

Whilst the chancre in due time, in the greater portion of its extent, cicatrises after conversion into a granulating wound, a limited portion of its margin retains its chancrous character. From this point, destruction proceeds peripherally, whilst from the centre the line of cicatrisation advances to an equal extent, and without reaching the ulcerating margin.

In this way, there results a linear, furrow-like, chancrous ulcer, advancing in course of time in large curves, the convex border abruptly margined and steep, evincing, as well as the adjacent part of the surface, the ulcerative character. The margin towards its concavity loses its ulcerative character, and shades off gradually into a granulating surface, on which the margin of cicatrisation advancing from the centre is lost, as if washed out.

Since such linear chancres, advancing in curves may proceed from several existing chancres at the same time, these will come in contact with one another in their peripheral advance, and form, together, serpiginous lines.

The course of the serpiginous chancre is extremely chronic, and is spread over many months, or, even, two or three years, unless active treatment be adopted.

The secretion from a serpiginous chancre retains its inoculability for a very long period. Hence, in the later stages, fresh chancres may be developed by auto-inoculation, and may themselves form centres, from which other serpiginous ulcers may spread. It is only after many months, or even years, that the discharge loses its contagious character, and the ulcer, at the same time, as a rule, also, spontaneously ceases to spread; healing results.

During this exceedingly chronic course, the serpiginous chancre traverses large tracts of skin, and, after the lapse of years, its extreme chancrous periphery, having started, for instance, from a point on the right side of the integument of the penis, may represent a line passing to the opposite side of the skin of the scrotum, and, from thence, over the raphé, to the upper third of the thigh; upwards, it extends to the abdomen, and, crossing the symphysis, again reaches the skin of the penis in a large curve, enclosing a completely cicatrised tract.

Whilst the varieties of the soft chancre, hitherto described, depend on deviations from its typical course, there are others, also to be named "soft," which, from the first, show characters differing from the type of the regular soft chancre.

The superficial chancre—*ulcus læve?* This is usually met with on the skin of the penis, or of the labia majora, in the form of a roundish, or irregularly-shaped, flat, superficial loss of substance, affecting only the uppermost layers of the corium, and of the size of a half-crown, or measuring several inches in circumference. Its margins are well-defined and sharply cut, not at all, or only moderately, infiltrated, sometimes slightly undermined. The base appears finely granular, and, at an early stage, of a bright-red colour, and there is a copious secretion of thin pus; at a later stage, it is mostly of a brownish-red colour, or covered with a greyish layer, has an iridescent, glistening appearance, and secretes a moderate quantity of pus.

The superficial chancre has an exceedingly chronic course.

So long as the surface of the ulcer and its margin secrete pus freely, and are of a bright-red colour, the pus from it is easily inoculable, and the ulcer usually spreads superficially, though not deeply. After several weeks, the secretion becomes scanty and thin, and is no longer inoculable, the surface of the ulcer has a drier aspect, and the ulceration seems to be arrested. At the same time, however, there is no tendency to heal. This state of things may last, with scarcely any change, for some months. At last, either

spontaneously, or as the result of treatment, a more active formation of granulations and of pus ensues, and is followed by cicatrisation.

The typical characters of the soft chancre are least developed in that idiopathic syphilitic affection which, from its appearance, has received the name of *ulcus ambustiforme.*

It is met with on the glans, the prepuce, or the mucous membrane of the entrance of the vagina—in fact, on parts covered by thin mucous membrane, or what resembles mucous membrane—in the form of sharply circumscribed, red, smooth, weeping surfaces deprived of epidermis, of variable size and shape, and, for the most part, so superficial that one supposes one has to do with a mere loss of epidermis—that is, with an erosion resembling that caused by a scald, or with, at the most, a very superficial loss of substance of the uppermost papillary layer, such as would result from a scratch or abrasion.

These erosion- or scald-like chancres, which are distinguished from ordinary excoriations by their having such abruptly defined margins, are exceedingly intractable, leave delicate, thin, glistening scars, and may be followed by exactly the same local and general consequences as any of the other forms of chancre which have been described.

Other varieties in the forms of chancre are produced by special localisation and various local complications.

The soft chancre may be situated on any part of the skin or the adjacent portions of mucous membrane.

Owing to its most common cause, inoculation during coitus, it occurs most frequently, in both sexes, on the genitals and adjacent parts, but it may, of course, be met with on parts remote from them.

SOFT CHANCRE ON THE MALE GENITALS.

Most frequently, the soft chancre is met with on the prepuce and glans; at the margin of the former, in the form of fissure or furrow-like ulcers, on the inner and outer surfaces of the prepuce, in the form of flat, red, sharply circumscribed weeping patches (ulcus ambustiforme), and as follicular or as slightly excavated ulcers covered with a layer of pus. The first may remain unaltered for a long time. The latter not unfrequently spread deeply and may then

lead to perforation of the prepuce, which may thus obtain a fenestrated appearance.

A common situation for a chancre is the coronal furrow of the glans, and, here, multiplication can easily occur by auto-inoculation, because the contagious secretion would be prevented from escaping. The multiple ulcers in the coronal furrow unite and form one continuous ulcer, with unequally indented margins, covering the bottom of the coronal furrow and spreading thence over the corona and the inner surface of the prepuce.

When the chancre is situated close to the frænum, in the coronal furrow, in a pit penetrating beneath the latter, it leads, during its further progress, to undermining and destruction of the frænum.

Occasionally, perforation of the urethra from below occurs.

Chancres of the glans spread very deeply in course of time and cause considerable destruction, and a pitted, cicatricial shrinking of the glans.

More rarely, one or more soft chancres occur on the skin of the penis beyond the prepuce and the glans, on the scrotum, at the root of the penis, and on the mons veneris, mostly in consequence of inoculation from a chancre on the penis, occasionally, however, originally and alone. Chancres in this situation are characterised by their deep, crater-like mode of spreading, and, on account of the ulceration and burrowing of pus in the loose cellular tissue found here, very much resemble buboes.

The inflammatory and œdematous swelling of adjacent parts which accompanies the soft chancres, and which appears more developed in proportion to the number of chancres, the amount of suppuration, and the destructive character (phagedæna), very often induces the complications of phimosis and paraphimosis, owing to the situation of the chancres on the prepuce and glans.

SOFT CHANCRES ON THE FEMALE GENITALS.

The parts of the female genitals most commonly affected with soft chancres are the portions of mucous membrane, and of parts resembling mucous membrane, which receive the first and severest shock, and, at the same time, are exposed longest to pressure from the male organ during coitus, for instance, the carunculæ myrti-

formes, the fossa navicularis, and the lower part of the inner surface of the labia majora.

Chancres in any of these situations are very liable to become gangrenous. From the inner and lower part of the labium, a phagedænic chancre often spreads deeply into the loose cellular tissue of the labium, undermines the attachment of the hymen or its caruncles, and makes its way along the vagina.

On other parts of the female genitals, chancres are more rarely met with, but they may occur on any part on, or near the meatus urinarius.

From thence, they may spread downwards to the anterior wall of the vagina, or even destroy the meatus itself, and extend for a short distance into the urethra.

Chancres may be met with on the prepuce of the clitoris, on the clitoris itself, on any part of the inner and outer surfaces of the greater and lesser labia. Owing to the mutual apposition of the numerous skin surfaces, and the retention of the purulent secretion from the chancres, in the numerous pits and folds of the female genitals, the greatest possible opportunity is afforded for the multiplication of the ulcers by auto-inoculation. For this reason, we may not unfrequently find as many as twenty chancres, or more, present, at the same time, in the same person, and distributed over the situations above mentioned.

The shape and condition of the chancres vary extraordinarily on these parts. We find all transitional forms, from the ulcerating rhagas, or follicle (follicular chancre), to the crater-like, or extensive and irregular chancre.

On the outer surface of the labium, where there are plenty of follicles, the chancre generally begins as a small pustule, from which a follicular chancre developes, or, as an acne-like, follicular tubercle, which becomes converted into a crater-like ulcer.

On the mucous membrane of the vagina and on the vaginal portion of the uterus, chancres are tolerably unfrequent. This is the more remarkable from the fact that, on those very parts of the male organ, the glans and the prepuce, which are most subject to contact and friction with the portions of mucous membrane of the female genitals mentioned, chancres are very frequently met with.

There is no doubt, however, that chancres do occur on these parts, though gynæcologists deny it. In plate ix, fig. 4, and plate x,

fig. 1, of my work before quoted, I have, for this very reason, represented such from cases under my own observation.

During their existence, they cause but very little pain, so that the patients are scarcely aware of their existence.

The soft chancres which are situated on the vaginal portion of the uterus bleed very readily.

In other respects, soft chancres of the vaginal mucous membrane and of the vaginal portion of the uterus go through their course in the usual manner.

SOFT CHANCRES ON OTHER PARTS THAN THE GENITALS.

In both sexes, chancres are exceedingly common on portions of skin in the neighbourhood of the genitals, and are more frequent and more numerous the more the parts are exposed to contact with the secretion from chancres situated on the genitals.

In men, therefore, the pubes and lower parts of the abdomen, owing to the proximity of the penis, are common situations; in women, the inner surfaces of the thighs, the raphé perinei, and the neighbourhood of the anus (almost solely in women), &c.

On and between the anal folds, owing to contact with the purulent secretion running down from the female genitals, chancres of a corresponding shape, resembling fissures and furrows, become developed, and, not unfrequently, penetrate for some distance within the anus along the ridges and furrows of the folds. It is often only by forcibly separating the folds that they can be detected. They are very painful.

At the anus, and, deeper, on the mucous membrane of the rectum itself, chancres may occur primarily, owing to coitus preternaturalis. Also in the crena ani.

At a distance from the genitals, it is rare, on the whole, to meet with soft chancres, yet experience shows that certain situations are more frequently affected than others. On the trunk, the nipple (of the female breast) is one of the commonest situations; in the neighbourhood of the face, the lip and the tongue; very rarely, the mucous membrane of the cheeks and palate, the skin of the cheeks and chin; certain occupations, again, render the fingers very liable to be attacked (medical men, midwives, and nurses).

In all the situations last mentioned, however, the chancres mostly become, at a later stage, of the kind known as "hard," to be described presently, and we shall therefore defer their more detailed consideration till then. Based on this experience, Ricord originally named the chancres occurring on any part in the neighbourhood of the face "chancres céphaliques," as typical and conveying the same meaning as the term "hard."

Both experiment and clinincal observation have, however, proved beyond question the occurrence of typically soft chancres on all the localities named.

Diagnosis and Differential Diagnosis of the Soft Chancre.

Though we are in the habit of regarding a chancre as a thoroughly special form of disease, yet it is very difficult to diagnose with certainty. Indeed, in the majority of cases, an absolutely objective diagnosis, based solely on a judgment formed from the observation of the symptoms presented by the patient at the time of examination, is wholly impossible.

Nevertheless, it cannot be denied that it is but rarely any one with a sufficient clinical training fails in diagnosing a chancre.

Of course, we make use of a whole series of factors which do not all belong to the chancre itself.

The special clinical symptoms described above, belonging to the chancre, the peculiar state of the margin and surface, &c., are, undoubtedly, when present, most important aids.

It is otherwise, however, when the signs described as typical of chancre are wholly or partially absent, as in the flat (superficial) chancres, or in those resembling erosions.

Here, as in many other maladies, we have to make use of various circumstances more or less apart from the disease itself.

Thus, in the first place, the *situation*. We are undoubtedly often guided by this. An affection which from its appearance excites the suspicion of its being a chancre, without, however, its characters being decidedly well marked, will be more reasonably and readily diagnosed as a chancre if it be located on the genitals, and especially on the parts which experience has shown to be the favourite seats of chancres, than if met with elsewhere.

On the other hand, we hesitate to call an ulcer on the cheek

a chancre, though, on account of the characters it presents, we should so name it, at once, if it occurred on the genitals.

In the matter of diagnosis, we shall not only at times find the points mentioned helpful, but, also, a number of others, for instance, the history given by the patient, so far, at least, as it can be thoroughly depended on.

One important aid to a satisfactory diagnosis is afforded by the exclusion of similar, non-syphilitic affections; such, for instance, as herpes preputialis, epithelial carcinoma, and pustular acne and scabies. As regards the differential diagnosis of these maladies, we must refer to the chapters of this work in which they are dealt with.

The *contagiousness* of the purulent discharge is a factor of great importance in the diagnosis of soft chancre. We know that such pus is clearly inoculable on any other, or on the same individual, and we are, therefore, justified in being certain as to the diagnosis of the existence of a chancre, when a fresh sore, similar to the first, is produced as the result of experimental or auto-inoculation.

Apart, however, from the number of cases (in private practice) in which, for various reasons, this diagnostic aid is not allowable, it often fails to be obtained. A chancre which suppurates but slightly, or resembles an erosion or a scald, or a gangrenous chancre, one which is in the stage of repair, or, as shall be shown subsequently, one which is affected with induration, may give no positive result after inoculation, though it is none the less a chancre, and attended by the same risk as regards the present and future of the patient.

The well-known researches of Boeck, Bidenkap, Köbner, Pick, &c., have considerably weakened the diagnostic value of experimental inoculations, for they have shown that the inoculability of the pus from a chancre decreases with any diminution in its concentration, whilst affections which by artificial irritation have been made to suppurate more, or for the first time, then furnish a secretion which is inoculable, though their former thin, scanty secretion did not show any inoculability.

More important still is the experience, also obtained experimentally, that pus which does not proceed directly from a syphilitic lesion—pus from scabies pustules (Pick, Reder) and from blennorrhœa (Morgan) in syphilitic individuals, is inoculable.

My own experiments have further convinced me that non-specific pus; for instance, from acne and scabies pustules, in non-syphilitic subjects, when inoculated either on the same, or on other non-syphilitic persons, gave rise to pustules, which were also inoculable; that such pustules resulted in loss of substance which healed by cicatrix; and that, as the number of the pustules arising from inoculation increased, the inoculability of the pus diminished, and then finally ceased altogether.

The diagnostic value of experimental inoculation as regards chancres is, therefore, by no means absolute.

It is of comparative and by no means slight value, however, from the fact that the pus from a typical, soft, virulent ulcer with copious discharge is almost invariably contagious.

It is by no means certain or axiomatic that, because the secretion from a sore is not inoculable, therefore, the sore cannot be a chancre, nor that pus which is inoculated with success must have proceeded from a chancre.

From what has been stated, it will be clear that the diagnosis of a chancre may, as a rule, be made quickly and with certainty by the aid of the symptoms present, but that, occasionally, the diagnosis will only be arrived at after careful consideration of all the clinical and histological conditions of the chancre and allied affections, and, finally, only from the data furnished by the progress.

THE HARD CHANCRE.

The hard chancre derives its name from the peculiar, almost cartilaginous consistence of the tissue forming it.

As a rule, it originates from a typical soft chancre, the latter undergoing a very remarkable change in character and course.

This transformation occurs most frequently during the third, often, however, earlier, in the first or second week of the existence of the soft chancre, and is completed within a few days.

Around and beneath the chancrous ulcer, there is developed a hard mass of tissue surrounding the margins and base, by which the surface of the ulcer is raised, the edges flattened, and the chancre diminished in depth and circumference at the same time.

The course of the chancre is also altered.

At the same time that the discharge of pus begins to diminish quickly from day to day and the inflammatory symptoms abate, the appearance of the soft chancre also changes; the base becomes raised nearly to the level of the surrounding tissue, the margins become smooth and flattened, and are continuous with the surface of the ulcer, not at all undermined. The surface, therefore, is slightly hollowed out like a mussel-shell, and appears as if it had been scooped out with a gouge (évidoir). Its area is also diminished by the approximation of its margins. The smooth surface has a shining, iridescent appearance, and the discharge consists of a little thin pus, which is not auto-inoculable. A line of cicatrix advances from the margins inwards, and the surface is rapidly completely healed within a few days.

A chancre which, from its size and appearance, we could only expect to heal in the ordinary course of things at the end of some weeks, will cicatrise over within as many days under these circumstances.

A chancre which is surrounded, in the manner described, by a specific induration of the tissue at its margin and base is known as the hard, indurated, or Hunterian chancre. After the ulcer has cicatrised, the peculiar induration of the tissue, alone, remains, and is designated specific induration, Hunterian induration, sclerosis of the chancre, or simply sclerosis.

When characteristically developed, it represents a nodule of almost cartilaginous hardness, which varies in shape, but is generally roundish, resembling a button or flat cake, elevates the skin, and possibly the surface of the ulcer before it, gives rise to the impression that a foreign body is infiltrated into and beneath the skin, can be held between the finger and thumb by its margins and base, is fairly well defined all round, and feels smooth to the touch.

The sclerosis is more extensive than the original chancre, because the latter is everywhere, both at the margin and base, surrounded by the sclerosis, and appears as if embedded or engraven in it.

The skin over the sclerosis is mostly smooth and shining, of a bluish-red or, over the most elevated part, of a glistening-white colour, not movable, because intimately connected to the sclerosis, and in the centre of the nodule is a cicatricial depression corresponding to the former ulcer, but very much smaller and more superficial.

The area, depth (thickness), and shape of the sclerosis vary very much. As a rule, as has been mentioned, it is larger than the preceding ulcer, because the latter is originally surrounded by it. The induration may, at one time, represent a ring (ulcus annulare) surrounding the seat of the ulcer or the slightly depressed scar, like a rampart, or at another, a plate of bony or caoutchouc-like density infiltrated beneath the base of the ulcer, or, again, a combination of the two. The sclerosis itself, at the base is either thick and of the shape of half a chestnut or a bean, its lower surface being convex, and admitting of being grasped by the fingers on either side, and its upper surface smooth or slightly depressed in the centre; or it is thin and flat, like a plate of bone; and in this form it is often very thin, like parchment, but at the same time very hard and elastic (chancre parcheminé).

According to its size and shape, the sclerosis may either be elevated (in whole or part), and apparent at once to the eye, the epidermis covering its most prominent part being stretched, glossy, and of a glistening white colour; or it is more deeply placed, and can only be recognised by the touch.

The tissue surrounding the sharply defined sclerosis is either not perceptibly altered or forms an œdematous swelling, often of considerable size, and of doughy consistence, the circumscribed and cartilage-like kernel of sclerosis within it being only discoverable on examination with the fingers.

The sclerosis is moderately painful on pressure.

After the ulcer has completely healed, the sclerosis may remain for many months, a year, or more and during this period may undergo changes in various ways. The induration may increase in size or may become superficially abraded by the repeated spontaneous bursting of the epidermis and of the scar, or may be converted by artificial irritation into a superficial and moderately suppurating, or even, exceptionally, into a deep ulcer, attended by very considerable disintegration of tissue, by which a portion of the nodule may be destroyed. Indeed, extensive gangrene may set in and remove the whole of the sclerosis.

The pus from such a secondarily ulcerating sclerosis may, when in sufficient quantity and concentration, again be auto-inoculable, just like the secretion from the soft chancre, or when the chancre was becoming indurated.

As a rule, the sclerosis begins to diminish by internal absorption, either spontaneously or under the influence of treatment, after it has existed without marked alteration, apart from possible ulceration, for weeks or months. The nodule becomes softer and smaller from the periphery inwards, its surface becomes wrinkled, and, finally, after the lapse of weeks or months, the portion of skin involved will have resumed its normal consistence and mobility.

Situation of the Hard Chancre.

A hard chancre may, of course, be met with on any part where chancres in general occur, since experience shows it may be developed from any soft chancre except those which are already gangrenous, and the phagedænic ones.

There are, however, certain localities in which induration is relatively of more frequent occurrence. It would appear that there is some truth in the view held by Ricord, that the character of the tissue in which the syphilitic virus is deposited is of special importance in reference to the induration or non-induration of the chancre.

This view is not absolutely true, however, because, as has been mentioned, hard and soft chancres, are both met with everywhere.

On the male genitals, sclerosis is mostly met with on the prepuce, its free margin, or inner or outer surfaces, in the form of large, hard, round, or semicircular, prominent nodules or disc-like infiltrations.

The thickening and rigidity of the prepuce, resulting from the sclerosis and the accompanying œdema, cause and maintain phimosis and paraphimosis, which may persist for months.

Indurated chancres are not at all unfrequent on the skin on the outside of the penis, less frequent on the glans, and when they occur here it is generally near the meatus or in the course of the urethra itself.

On the female genitals, the labia majora and minora, and the prepuce of the clitoris, are the situations in which hard chancres are most commonly met with.

As there is generally only one hard chancre present, or one nodule of sclerosis remaining after the healing of the ulcer, the affected portion of tissue stands out prominently from the other normal structures.

The labium majus, as a whole, is thickened, enlarged, and prominent, its skin surface is pale over most parts, but over a limited portion, that which projects most, it is at first of a bright- and, subsequently, of a dusky-red colour. On its inner surface, or it may be at any other part, there will either be a superficial ulcer or a superficial cicatricial depression, showing traces of its former presence. The labium is hard at all parts, but only in a limited portion is there specific induration, and, here, also, occasionally, corresponding to the dusky patch on the surface, the sclerosis may be felt as a deeply situated, rounded nodule. The rest of the swelling is of the consistence of firm dough, just like that of chronic œdema.

The lesser labium, when affected with induration, is enlarged and thickened, deeply furrowed, rigid, so that it projects between the labia majora.

A hard chancre is but rarely met with on the vaginal mucous membrane; it is of more frequent occurrence on the vaginal portion of the uterus.

In the neighbourhood of the genitals and of the anus, hard chancres are extremely rare, and still more so on the trunk, with the exception of the lower part of the abdomen, because opportunity is seldom afforded for inoculation.

At a distance from the genitals, hard chancres again become tolerably common on the nipple of the female breast (in nurses), in the neighbourhood of the face, and on the fingers.

The nipple becomes thickened and raised, projects forward stiffly and has on its surface a sharply-defined, superficial or but slightly

depressed ulcer, of the size of a lentil or from that to a half-crown, or we find a slightly depressed scar. The surface of the ulcer is red, finely granular, and secretes a rather thin pus, or appears as if smeared over with mucilage, of a reddish-brown colour, dry and fissured, or is covered with a yellowish-brown layer of pus infiltrated into the superficial layers.

Chancres in the neighbourhood of the face so generally become indurated that Ricord, on this account, thought the term chancre céphalique synonymous with that of hard chancre. There is no doubt however, that typically soft chancres also occur, though rarely, on these parts.

The lip, upper or lower, is the part of the face most commonly affected with hard chancre. A portion of the lip, either in the centre or at one side, becomes remarkably thickened and prominent. If we evert the lip with the finger, we find that the red margin of the lip corresponding to the projection is occupied by an ulcer of the size of a lentil or sixpence, sharply defined, superficial, red, finely granular, or covered with a yellowish layer of detritus, or a dry, reddish-brown, fissured crust. The prominent portion has a firm, elastic feel and is painful on pressure.

Hard chancres on the cheeks, chin, and fingers present very similar appearances; in addition to an ulcer (which may be of various shapes, superficial, like an abrasion, or more deeply penetrating, and discharging pus copiously) or a corresponding scar, we find a discoid, globular, or button-like sclerosis.

Hard chancres of the tongue generally look like soft ones on the surface, and it is only on digital examination that we recognise the nodular induration in the substance of the tongue.

Diagnosis of the Hard Chancre.

The diagnosis of a hard chancre goes hand-in-hand with the recognition of specific induration. This applies equally to the diagnosis of a hard chancre from non-syphilitic affections, having only an external resemblance to it, and from a soft chancre.

So far as the hard chancre is an ulcer all those data are useful for diagnostic purposes which were enumerated under the head of symptomatology, and are partly of importance in the diagnosis of a soft chancre.

The clinical peculiarities of the ulcer are undoubtedly of the

first importance for diagnosis. They do not always suffice, however, on account of the variety they present, and their possibly ill-marked character, at the time, and our judgment must be formed after considering many other points.

The *situation* is of no less value than in the diagnosis of a soft chancre. On the genitals or the lips, a hard chancre is more easily diagnosed than on the cheeks, on account of the conclusions we arrive at from experience as to the cause of the affection.

Contagiousness is even less helpful in diagnosis in the case of a hard than of a soft chancre. The hard chancre is only auto-inoculable (in the sense of exciting a chancre-like ulceration when its secretion is inoculated) when it has a copious purulent discharge; either from the first, and then it comes under the category of the mixed chancre of the dualists, or after artificial irritation.

Even, however, if the inoculation proves successful, it is not by any means conclusive, for experiments such as those mentioned above have shown that the pus from non-syphilitic eruptions, scabies pustules, &c., may excite pustules and ulcers capable of inoculation in syphilitic and non-syphilitic subjects.

No one has ever yet succeeded, however, in producing a second *indurated* chancre by inoculation from a chancre on the same individual.

It is sometimes difficult to distinguish the specific, ulcerated or cicatrised sclerosis from similar, non-syphilitic, hard nodules.

Nodular formations of a non-syphilitic character which may closely resemble the induration of a hard chancre are liable to occur on the genitals, mons veneris, and lips. Amongst those most commonly met with may be mentioned boils, carcinoma, keloid and the nodules of the burrows in scabies.

Boils on the labia, mons veneris, and lips, in addition to the circumscribed nodules necessarily caused by their presence, also induce an œdematous swelling of the surrounding tissue. In appearance and to the touch, they then closely resemble what is met with in sclerosis, for the indurated nodules can often only be detected within œdematous swellings. The accompanying inflammation of the skin and the amount of pain will aid us in excluding sclerosis. In cases which are still less definite, the further course of the disease, alone, can clear up the diagnosis.

For instance, in cases of very chronic abscess of the labia majora or minora (abscesses in the glands of Bartholini) and of the lips

(in the latter situation especially), the similarity between the two processes may be such that even an experienced practitioner may be unable to arrive at a diagnosis except by observing the course of the disease.

Carcinoma of the prepuce, labia majora and minora, and the lips often simulates an indurated chancre and for a long period. Cases in which the disease is well developed and the appearance characteristic can, of course, hardly give rise to any confusion. But a cancerous growth which infiltrates at an early period and developes slowly, may cause the labium majus or the lip to assume an appearance and communicate a sensation to the fingers not to be distinguished from what is met with in indurated chancre. Even the cicatricial contraction which ensues at one part in the further course of the disease (cicatrising epithelioma), on the labium majus, for instance, is not conclusive as to diagnosis, because the sclerosis corresponding to the previous ulcer is in the habit of becoming cicatricially depressed. Both processes are chronic. I watched a case of this sort, in conjunction with Professor Hebra, for months, and in spite of a careful consideration of the symptoms bearing on both sides of the question, it was not till after the lapse of a year, and when enlargement of the neighbouring glands, and nocturnal lancinating pains had set in, that the malady was clearly recognised to be carcinomatous.

Epithelial carcinoma of the cervix uteri can scarcely be distinguished from a hard chancre of the same part.

In many cases, where feasible, a microscopic examination may reveal the nature of the disease at an early period.

The tubercles of acne and scabies affecting the prepuce may generally be easily diagnosed from indurated chancres by any one who has had much practice and who pays attention to the other symptoms present.

The preceding observations do not by any means include all the difficulties which may possibly be met with in the diagnosis of hard chancres. They deal, however, with the most important data, and are sufficient to show that a correct diagnosis of hard chancres, as such, may often be arrived at easily, but, on the other hand, frequently only with the aid of a consideration of all the symptoms belonging to a hard chancre, *per se*, and those of other affections more or less allied, and, more particularly, by observing the course of the disease.

It is often, however, much more difficult to tell whether a chancre is hard or soft, and is sometimes impossible.

If the induration is such as that described above as typical, that is, a well-circumscribed nodule of distinctly firm consistence, and easily grasped between the fingers, or more discoid in shape, the affection may at once, without hesitation, be diagnosed as a hard chancre, according to present custom.

It is otherwise, however, when the induration only presents the appearances above named in an ill-characterised form. We undoubtedly meet with chancres which only have a moderate and by no means typical induration of the margin and base, such, indeed, which might equally occur from simple inflammation, and yet they go through the same course, and are followed by the same group of symptoms as typically hard chancres. Ricord said of such chancres that the specific induration was at the tips of the fingers—that is, in other words, that our judgment under such circumstances must be wholly subjective.

I prefer to say that in many cases the induration cannot be diagnosed, or that, as a rule, it is only typical induration which can be recognised.

That many should diagnose induration, *quand même*, and even speak of the existence of a hard chancre, though the most practised sense of touch wholly fails to detect the slightest hardness, arises from a desire to justify the doctrine of duality, according to which certain symptoms, and notably those of constitutional syphilis, can only be accounted for by the pre-existence of a hard chancre, and are incompatible with a soft one. Such a mode of arriving at a conclusion is wholly theoretical, and cannot lead to a practical diagnosis.

It is, indeed, highly desirable, for thoroughly practical reasons, that we should be able in every case to tell whether we have to deal with a hard or a soft chancre. At present, however, seeing how frequently we meet in practice with forms of chancre intermediate between the hard and soft varieties, it must be acknowledged that it is often impossible to draw a sharp line of demarcation.

The practical value of such a distinction, however, even if it were possible, becomes considerably diminished if we bear in mind, in the first place, that constitutional syphilis may follow typically soft, multiple chancres associated with symmetrical suppurating buboes; and further, if we recollect that there are forms of chancre which cannot be classified as hard or soft, but owe their peculiarities to

other characters—the phagedænic, diphtheritic, superficial, scald-like, eroded, and serpiginous chancres.

In reference to these forms of chancre, the doctrine of duality affords no conclusive guide enabling us to state beforehand whether the much dreaded constitutional symptoms will follow or remain absent.

It is these constitutional symptoms, however, and not the actual local phenomena, which make the chancre of so much importance clinically, and constantly give rise to fresh theoretical explanations.

Results of the Chancre.

It is seldom that the clinical importance of the chancre ceases on the subsidence of the clinical symptoms peculiar to it.

On the contrary, special maladies not unfrequently become developed, either during its course or subsequently, which may be distinguished as either primary or direct, and remote or indirect consequences.

The immediate results of the chancre, in addition to the destruction of tissue caused by the ulceration and the subsequent cicatrisation, consist in an inflammation of the lymphatics and lymphatic glands anatomically associated with the part affected.

Owing to the special cause at work, we call this a specific lymphangitis and adenitis. The latter is also designated shortly and specifically as bubo.

Both these conditions, lymphatic and glandular inflammation, may occur simultaneously, or at different times, or either one or the other may alone be met with.

They may become developed either whilst the chancre is still present or, not unfrequently, some long time after its complete cicatrisation.

The remote or indirect symptoms are very varied in their characters, may persist for many months or years, or even throughout the rest of the patient's life, or recur from time to time, may affect the skin, mucous membrane, internal organs, bones, glands, secretions, and, in short, the whole organism, and are summed up in the term "constitutional syphilis," or lues venerea. They constitute the special subject of syphilodology, and we must therefore content ourselves, here, with merely calling attention to them. In regard to the symptoms of constitutional syphilis affecting the skin, that is, the cutaneous affections known as syphilides, their special relation to the chancre, and their bearing on the doctrine of syphilis in

general, I may refer to my work on these subjects, 'Syphilis of the Skin and adjacent Mucous Membranes,' with seventy-six chromo-lithographic plates and thirteen woodcuts, Vienna, Braumüller, 1875.

I must also refer to this special work in regard to the anatomy of the sclerosis peculiar to the hard chancre—the so-called Hunterian induration.

By taking the soft chancre as our type of ulcers, we have already recognised the fact that, so far as our present methods of research enable us to judge, the anatomical characters of the soft chancre, that is, one without any trace of induration, agree with those met with in inflammatory ulcers (see page 14 of present volume).

The Treatment of Chancres.

The treatment of a chancre, so far as it is an ulcer, must be carried out according to the principles which would guide us in the therapeutics of ulcers in general. Though these ulcers owe their origin to some specific virus, yet, in consequence of our want of knowledge as to the physical and chemical nature of this poison and the failure of all experiments, we are quite unable to adduce any specific means of curing a chancre. The same remedies, therefore, which will cleanse ordinary ulcers and tend to produce healthy granulations must be used in treating chancres. They are those which we have mentioned in detail in dealing with a particular example of ulcers—ulcers of the leg, p. 28, &c., of the present volume.

We must especially recommend one remedy in the treatment of chancres, which is not available in other cases, and which we have found very efficient and convenient, and therefore valuable in practice, namely, the emplastrum hydrargyri. In addition to the convenience with which it can be applied, it has the further advantages over watery and greasy applications that it adheres well, and prevents, as much as possible, adjacent parts coming in contact with the purulent discharge from the chancre and becoming inoculated; that no crusts will form beneath, which would otherwise cause retention of pus and increase of inflammation; and, lastly, what is of most importance in reference to the subsequent symptoms, the induration disappears most quickly and completely under the grey plaster.

The discussion of methods of abortive treatment by means of cauterisation or excision belongs to treatises on syphilis.

II.—ULCERS RESULTING FROM NEW GROWTHS.

There are a number of new growths which are usually attended by ulceration at some stage of their progress. At page 19 we have enumerated lupus, lepra, carcinoma, sarcoma, and syphilis, as causing ulceration. In all these, the essential clinical and histological characters of the ulcer present will be derived from the new growth itself; for this reason such ulcers cannot be discussed apart from the respective new growths.

We have already, in this work, dealt with their characteristics, course, diagnosis, histology, and treatment, to the best of our ability and knowledge, in the proper places; the lupus ulcer is treated of at page 57, vol. iv; the leprous ulcer at page 146, vol. iv; and the carcinomatous ulcer at page 204, &c.. vol. iv.

We must, however, here, give more detailed attention to the symptomatic syphilitic ulcers resulting from syphilitic new growths (nodes, gummata), and which are to be regarded as the products of constitutional syphilis.

SYMPTOMATIC SYPHILITIC ULCERS.

(*The Ulcerating Syphilide; Syphilis Cutanea Ulcerosa.*)

Symptomatology.

The most typically syphilitic ulcer is that which proceeds from a single, isolated nodule in the skin.

It is circular and has well-defined, finely indented, and somewhat undermined margins; the margin and floor are covered with a greyish-yellow layer, are disintegrating, and infiltrated for a certain distance, both superficially and deeply. The ulcer is extremely painful, both spontaneously and when touched.

If the infiltration does not increase, the disintegration spreads,

both superficially and deeply, as far as the margin of the healthy tissue. When this is reached, the ulcer granulates and cicatrises, just as in an individual who is not syphilitic.

The form, size, extension, and arrangement of the disintegrating nodule determine, therefore, the form, depth, extension, and arrangement of the ulcer.

This is so definitely the case that we at once get rid of a syphilitic ulcer as soon as we remove the gumma which causes it, as, for instance, by the application of a caustic. This evidently can only occur with certainty when the cause is a nodule which is completely isolated, especially deeply.

It follows, therefore, that the syphilitic ulcers primarily follow the arrangement and course of the cutaneous syphilitic nodules.

The ulcer due to a single nodule remains circular so long as the nodule does not increase beyond its original size, or spreads equally in all directions. Experience shows that the latter occurs for a certain time only, after which the formation of new specific infiltrations disposed to disintegrate takes place at only a particular part, say two thirds of the circumference. Hence the reniform shape of the larger syphilitic ulcers. Where the disintegration has reached the healthy tissue, granulations form and cicatrisation ensues, whilst the ulceration spreads in the opposite direction, where the new infiltration is taking place. The ulcer has an inner, concave, flat, cicatrising margin looking towards the original centre, and an external convex, ulcerating, abruptly sloping margin, which has a border of infiltration external to it, between it and the adjacent normal skin.

In this way an ulcer may in course of time travel far from its original starting-point, and convert a large tract of skin into a scar.

Reniform ulcers proceeding from separate nodules, originally placed circularly to one another, unite to form serpiginous ulcers as soon as they touch. The relation of the margins of the ulcers to the cicatricial centres always remains the same. The inner, concave margin of each segment, which is being steadily encroached on by the cicatrisation proceeding from the centre, is flat; whilst the outer one is steep and ulcerated, and separated from the adjacent, healthy skin by a convex border of infiltrated material.

Under similar circumstances, we see single or compound, that is, grouped, circinate or serpiginous, rupial forms of ulceration—rupia syphilitica ulcerosa—when the slowly advancing circular ulcers and

infiltrations become covered with massive crusts, owing to drying up of the purulent secretion. If the rupial crusts are removed, deeply excavated, characteristic ulcers or infiltrations will be exposed, differing from other, so-called rupial forms, such as may be met with when any chronic, exudative or suppurative process, which spreads from the centre, peripherally, is present, for instance, in pemphigus circinatus and serpiginosus, in excoriatio ns, &c. (so-called rupia non-syphilitica of authors).

The ulcers which become developed from small cutaneous or large subcutaneous gummata differ somewhat from the above typical ulcers.

The former are more crater-like, and only exhibit a tendency to ulceration at the margin of the small opening. In comparison to their size, they penetrate much more deeply than the ulcers developed from larger cutaneous nodes.

Ulcers developed from gummata of the subcutaneous cellular tissue are very rarely met with in association with the typical superficial cutaneous ulcers. Each ulcer forms an excavation, which corresponds in size to that of the gumma.

As the two last-mentioned nodes, the small ones in the skin and the gummata of the cellular tissue, do not usually become arranged relatively to one another in the same way as the larger cutaneous nodules, but spring up quite irregularly, side by side and beneath one another, and grow towards one another, so, also, the ulcers arising from them become combined quite irregularly, either at the ulcerating cutaneous margins or subcutaneou sly.

The latter is the case, obviously, as regards the cutaneous ulcers resulting from gummata which have involved the skin by spreading from the deeper strata, periosteum, bones, or muscles, and have coalesced.

Consequences and Complications of Syphilitic Ulcers.

The direct result of a syphilitic ulcer is the destruction of the affected tissue, and this, as a rule, involves the whole area of the nodule, because it is only exceptionally, and where effective treatment has been adopted, that it partially disappears by absorption, when once ulcerative disintegration has set in. The area involved in this destruction, therefore, will vary in proportion as the infiltration and the disintegration extend superficially or deeply. The loss of sub-

stance will be most marked when the disintegration has commenced from beneath, and, therefore, in subcutaneous gummata. The small opening which results after the softened gumma has burst, often contrasts remarkably with the enormous extent of the subcutaneous, ulcerated cavity.

The degree of functional disturbance produced, and the clinical importance to be attributed to the loss of substance and cicatrisation resulting from the syphilitic ulcers, depend, apart from the general circumstances above mentioned, on the locality affected and the physiological importance of the part of the body involved. According to the different locality affected, also, various departures from the typical group of symptoms, and complications and results of various sorts are met with, which are of particular importance as regards diagnosis, the nosological significance of the affection, &c., and from this point of view, therefore, the ulcerative syphilide is worthy of more special discussion.

As we wish to confine ourselves to matters of most importance from a practical point of view, we shall here deal only with syphilitic affections of the scalp, face, trunk, and extremities.

Localisation on the Scalp.

Syphilitic affections of the scalp always show a particular tendency to undergo suppurative disintegration. Even during the first stage of the eruption, and when, on other parts of the body, only macular or papular forms are present, small or large papules, becoming converted into pustules (impetigo syphilitica) and leaving scars of corresponding size, will be found on the scalp.

Of greater importance are the forms of ulcer which result from cutaneous or subcutaneous (periosteal) gummata.

The former may either be isolated, or may sooner or later become arranged in groups and circles, and thus, at first, give rise to isolated or circular ulcers, and, later, to kidney-shaped, or, later still, confluent, serpiginous, superficial ulcers, with flat, or uneven, fatty-looking, or easily bleeding surfaces, and thick, bossy, widely undermined margins. Owing to this undermining of the margins, they may communicate with one another subcutaneously in various directions. They secrete a thin, sero-purulent fluid, which is effused over the adjacent parts, and, together with the

secretion from the sebaceous glands, dries up into discoloured, massive, foully-smelling crusts, which mat the hairs together, cover the ulcers loosely, and can easily be removed. They may either be confined to a single region of the scalp, or may appear simultaneously or soon after one another in various parts. In the latter case, by progressive peripheral advance and coalescence, the whole scalp may finally become converted into a single ulcerated surface, which is bounded, all round the skull, by a continuous, everted, sinuous margin, convex outwards, and widely undermined here and there, and it is only in places, corresponding to the separate centres of origin, that this ulcerated surface is interrupted by old, white or fresh, hyperæmic or disintegrating scars.

Beyond the sinuous margins described, the skin is occasionally undermined for long distances, and lifted up from the subjacent parts, by burrowing of pus, in pouches, especially over the forehead and temples, so that, for instance, a sinus may lead from the margin of an ulcer on the scalp to the upper lid, and the latter may bulge forward like a bag.

From the base of the ulcer, occasionally, densely crowded, luxuriant granulations develop, growing to the height of several lines; they are lobulated, bleed easily, and secrete an offensive, sanious fluid, which dries up into dirty-looking crusts, and, at the same time, the ulcerating, elevated infiltration continues to spread, either circularly or only at a part of the periphery.

This formation of papillary outgrowths is met with in all forms of chronic granulating affections affecting the hairy parts of the body—in sycosis, eczema, pemphigus, lupus, &c.—and is not peculiar to syphilis.

Years will invariably have elapsed before the ulcerative process will have spread to this extent from one or several centres. In the meanwhile, various changes in the shape and appearance of the diseased parts and various complications will have arisen, and influenced, in some measure, the course, results, and termination of the disease.

In reference to *prognosis*, it is first of all noteworthy that experience shows it is uncommon for the cutaneous ulcers described, even when they attain so large a size and last so long a time, to involve the bones of the skull. There may be no necrosed bone anywhere. By appropriate treatment, we may induce complete cicatrisation in a remarkably short time, and may, therefore, even

consider a case in which the whole area of the scalp is ulcerated as comparatively unattended with danger.

Even in cases where rough (necrosed) bone can be detected, here and there, with a probe, or large tracts of bone, the whole of one parietal bone, for instance, may be exposed, showing a necrosed, greyish-black, porous, worm-eaten surface, whilst the soft parts for some distance around are in a condition of specific ulceration and appear widely undermined, cicatrisation may ensue. In such cases, however, no estimate can be formed of the time necessary for cure.

That which is more especially under the control of treatment is the specific ulcerative process in the skin. We can soon obtain mastery here.

The exfoliation of the necrosed portions of bone, however, demands an indefinite time. It frequently occurs with remarkable rapidity, as the necrosis mostly affects only the external table of the bones of the skull, and cicatrisation takes place by the same process of granulation by which the necrosed layer is thrown off. When the process is tedious, opportunity is afforded for collections of pus to form in dependent situations, especially in the eyelids and spheno-maxillary fossa (Flügelgaumengrube), for erysipelas to occur, &c., and, thus, various dangers may arise, or even death result. Fortunately, this is but rarely the case and a favorable termination the rule.

Of course, scars remain on all parts which have been ulcerated, and the patches are bald. The scars, for a long time, have a glistening, congested, parchment-like appearance, and are easily excoriated. As age advances, they become of a glistening white aspect, and capable of resisting irritation.

Scarcely any difficulties of importance can arise in reference to the diagnosis of syphilitic ulcers of the scalp, if we bear in mind the characteristics of syphilitic ulcers in general, and the special peculiarities just described in regard to the locality affected.

As to the combination with papillary outgrowths, it must not be overlooked that the latter, as has been already remarked, may arise in connection with all sorts of chronic granulation- and inflammatory processes (sycosis, eczema, pemphigus, &c.), and do not, therefore, *per se*, afford any special indication of syphilis; and further, as I have already shown,[1] similar vegetations may arise idiopathically and

[1] See vol. iii, p. 170, of this work.

as a disease *sui generis;* so that, when such growths are present, we can only regard them as syphilitic on similar evidence to that which avails in the diagnosis of syphilitic nodes and ulcers in general.

Localisation in the Region of the Face.

Syphilitic ulcers may be met with on any part of the skin of the face, the eyelids, or the external ear, including the external meatus, and may either originate in isolated nodules or in nodules having, primarily or secondarily, a circinate or annular arrangement.[1]

They are most common on the forehead and nose, then on the upper lip and in the immediate neighbourhood of the nasal and buccal openings; around the latter, they spread in larger and larger curves, either continuously or with frequent relapses, and, in this way, may destroy all the soft parts down to the bone, and even the latter, occasionally, and may be followed by considerable cicatricial contractions. We once saw an ulceration of this sort, in a girl thirteen years of age, which involved the whole of the central part of the face in one ulcer, whose everted, sinuous, fatty, ulcerating margin reached from the glabella, close to the inner angle of the eye, on one side, over the malar region, to the angle of the jaw, and from thence, over the deeply ulcerated and loosely hanging lower lip, across the opposite cheek, and back again to the glabella. Over the area thus circumscribed, the soft parts, the cartilaginous part of the nose, and the upper lip, were almost wholly wanting, so that the alveolar process of the upper jaw was laid bare.

Destruction, shrinking, and retraction of the eyelids we have often seen. We have never, however, seen the syphilitic process spread to the conjunctiva bulbi and the cornea, whilst lupus is well known to do so.[2]

Undoubtedly, the *nose* is the most frequent seat of syphilitic tubercles and the ulcers resulting from them, and the most important practically.

Brownish-red tubercles, of the size of peas or larger, make their appearance on various parts, most commonly the sides of the nose and the alæ nasi. They are either isolated or become grouped together to form extensive, bulky, irregularly bossy infiltrations, painful on pressure. Over some of the tubercles, pustules may form, and

[1] See vol. i, p. 23. (TR.)

[2] 'Arch. f. Dermatol. und Syphilis,' Jahrg., 1869, 3 Heft.

after they have burst, crater-like ulcers may be exposed. Even at this period, as soon as the pustule has burst, the destruction may have penetrated deeply down to the cartilage, or even through this to the mucous membrane, for the softening began in the middle of the tubercle, and the formation of the pustule was merely a symptom of the spreading of the central disintegration.

In the situation of such a tubercle, the mucous membrane of the ala nasi is covered with crusts. The latter often form the only covering concealing the aperture of the small ulcer which has perforated or is just about to perforate on this side also. After the perforation has occurred, a hole, which rapidly enlarges, owing to extension of the ulceration, is left in the wall of the nose.

Very considerable destruction, however, may result in a comparatively short time without any such process.

The cavities of the ulcers proceeding from the separate tubercles placed close together may become connected to one another subcutaneously, before the skin over them appears particularly congested or thinned. If perforation occurs in such a case, at separate points, we are very liable to consider the affection as of trifling significance. If we push in a stick of nitrate of silver, however, we find, to the great dismay of the patient, though scarcely to the surprise of a practitioner acquainted with such matters, that the destruction has spread widely beneath the skin, for the tissue melts away to a pulp before the easily penetrating caustic, and the stick often penetrates from the outside, so as to be visible within the cavity of the nose.

In this way, a portion of the cartilaginous part of the nose, or even the whole of it, may, within a very short time, be separated from the bony part of the nose, or even completely cast off, before it has really been destroyed. For this to occur, it is only necessary that a few ulcers involving the whole thickness be suitably arranged.

At another time, the disintegration may gradually spread from the margins of the alæ nasi, or the upper lip, extend unequally in different directions, and leave the parts irregularly stunted.

The appearance, course, and results of ulcers affecting the nose will further depart, in various ways, from the above description, if they are due to the penetration and disintegration of syphilitic nodules in the mucous membrane, or are combined with necrosis and loss of the bones, the vomer, &c., supporting the soft parts.

Syphilitic ulcers of the nose, generally become covered with thick,

discoloured crusts, which envelope the whole nose, as if with a rigid capsule, plug up the nostrils, and, by their bulk, give rise to the idea that the nose is abnormally increased in size. It is only after removal of the crusts, we discover that, on the contrary, the nose is very defective, and, possibly, that even what remains is hardly durable, as it is partly covered with fatty-looking ulcers, and partly so infiltrated with nodules, that its preservation is scarcely feasible.

Now and then, the nose appears enlarged after the removal of the crusts, owing to bulky, lobulated, papillary outgrowths, several lines in height, having become developed on the ulcerated surface, similar to what one not unfrequently observes in lupus exulcerans.[1]

These luxuriant vegetations, bleeding easily, and secreting an offensive, purulent discharge, occasionally hide the perforations but very imperfectly, and undergo themselves an irregular, but steady disintegration.

Diagnosis.

That the tubercular and ulcerating syphilitic affections of the face vary very much in appearance will be evident, even from the extremely concise sketch which has been given. The diagnosis, however, is not by any means difficult when the changes are well exposed to view, owing to the markedly developed, specific symptoms.

Difficulties arise, only, when the specific symptoms are obscured by complications, and, especially, when the locality affected is the nose.

Isolated syphilitic tubercles may easily be mistaken for acne vulgaris, and, especially so, when pustules are present on them. The fact that they are deeply seated, their broad base, the slight symptoms of inflammation present, the absence of inflammatory redness, the painfulness on pressure, the firm consistence of the tubercles, the fact that this firmness persists after the pustule has burst, and, especially, the characteristic ulceration which is seen at the margins of the opening—all render it quite feasible to exclude the supposition of acne at an early period. When once the ulcerative destruction is manifestly spreading laterally and deeply, there can no longer be any doubt as to the nature of the process.

[1] See vol. iv, p. 66.

When syphilitic tubercles coalesce to form large, widespread, bossy, firm infiltrations, extending over the dorsum of the nose and the adjacent parts of the cheeks, the affection greatly simulates acne rosacea and lupus tumidus.

Undoubtedly, for some time, there is room for error or hesitation in regard to these two maladies, and the more so, because, on the one hand, the formation of pustules and brownish discoloration may be met with in them, and, on the other hand, the syphilitic tubercles may show teleangeiectases, scales, and reddish discoloration, and, also, just at the time that such syphilitic productions occur, all other symptoms of the disease may often be wanting.

Any confusion with acne rosacea is scarcely possible when once ulceration has set in, or when there are symptoms of that regular atrophy and retrogression which syphilitic tubercles usually undergo.

It is otherwise as regards lupus. This disease closely resembles tubercular and ulcerating syphilis in its variety of forms, the parts attacked, its destructive tendency, the formation of ulcers and vegetations, the shrinking of the tissues and their wearing away by ulceration.

In fact, the difficulties in distinguishing between the two are very great, and occasionally, though only temporarily, insurmountable. It is owing to these difficulties in differential diagnosis, arising from the great similarity in clinical and anatomical symptoms, that some pathologists, even at the present day, look on such cases as of a mixed character, and designate the affection as lupus syphiliticus.

I have, already, elsewhere (see vol. iv, p. 85) shown, in detail, that the idea of the existence of a lupus syphiliticus must be given up, and that, in each instance, we have either to do with syphilis, or lupus—never with both at the same time.

As regards the tubercular form of syphilis, before ulceration has occurred, it may be distinguished from lupus, usually, by the much greater size, consistence, bulk, and painfulness of the individual tubercles, not unfrequently by their colour, and, especially, by the peculiar character of the symptoms of involution.

The tubercles of lupus are rather friable than firm, less bulky, not painful, and do not undergo such a typical involution as the syphilitic ones; almost always, also, at the margins or in the neighbourhood of the confluent lupus nodules or ulcers, there will be

fresh lupus nodules, which may be recognised as such by their small size, their being deeply placed, and appearing as if "embedded" in the tissue of the cutis, and clearly differ from syphilitic formations.

The ulcerations in lupus, also, are essentially different from those of syphilis. They are often, it is true, circular in shape, but they never penetrate deeply, and they never appear as if they had been punched out; the margin and base are but slightly infiltrated, not speckled over with fat; they bleed easily, and, after the removal of the layer of pus from them, look bright-red and freely granulating; they are far less painful than the syphilitic ulcers; their margins are not infiltrated, not undermined or everted, but smooth, thin, and surrounded by congested, shining, thin skin.

It is but rarely, also, that other distinguishing features are absent. Thus, in the neighbourhood of the ulcers, in lupus, there are almost invariably fresh, small, inconspicuous nodules of lupus. Necrosis and loss of the bony framework of the nose, of the vomer, we have never as yet met with in lupus, and, therefore, have never seen the well-known depression of the root of the nose, in lupus, which is almost pathognomonic of syphilis.

If we cannot at our first examination make out the nature of the case by any of the points of difference mentioned, continued observation and the good effect, or uselessness of specific treatment will clear up the diagnosis as to whether, in any particular instance, we have to do with lupus or syphilis, and we need never take refuge in the hybrid term lupus syphiliticus. Such further observation will also show, that the whole course of the old and the development of the new nodules will vary according as we have to do with lupus or syphilis. In syphilis, weeks and months will suffice for an amount of development, ulceration, and disintegration, which in the case of lupus would scarcely occur in as many months or years. In lupus, the tissues diminish in bulk by a process of atrophy as much as, or more than, by ulceration, whereas the contrary occurs in syphilis. This accounts for the thin, slender, atrophied, "worn-away appearance" of the nose after lupus, contrasting with the thick or normal aspect of the portions remaining after syphilitic ulceration.

Apart from the local conditions, we must note that lupus very seldom or never arises primarily in riper years, but is met with as a prolongation or renewal of an outbreak of lupus in youth, and that, consequently, tubercles and ulcerative processes appear-

ing late in life are, *eo ipso*, much more likely to be due to syphilis than to lupus.

As regards the differential diagnosis of carcinoma affecting these parts, we must refer to the chapter at page 202, vol. iv, *et seq.*

The syphilitic affections of the hairy part of the face, appearing in the form of isolated or grouped, exfoliating or ulcerating nodules on the chin, cheeks, or upper lip, closely resemble sycosis, not only when covered with crusts, but, also, after their removal, on account of the coarsely granular surface exposed to view. From the history of this disease [1] we learnt that it was originally regarded as contagious, and that we have reason to consider the sycosis or ficosis of the Romans as really being a syphilitic affection. What we nowadays regard as sycosis is a non-syphilitic, tubercular folliculitis, which, at the most, only simulates syphilis when there is a luxuriant formation of coarse granulations resembling the outgrowths from syphilitic ulcers.

The peculiar state of the margins of the syphilitic nodules, their infiltrated, ulcerated condition, their everted appearance, and their painfulness, will all prevent any real confusion arising between them and sycosis.

Localisation on the Trunk.

The parts of the trunk most commonly affected with tubercular and ulcerating syphilis are the back and the buttocks. It is seldom that the chest and abdomen are attacked. We mostly find cutaneous ulcerating nodules, which spread peripherally from one or several centres, or, from the first, are arranged in circles. In the latter case, large tracts of skin, over the whole of the back or of the buttocks may quickly become infiltrated and converted into cicatricial tissue.

Deeply-seated gummata may be met with, here, now and then, and also on the breast, in great numbers and of large size, that of a walnut or lemon, in the form of globular tumours or spread out like a flat cake. After adhesion and thinning of the skin have occurred, they burst, and large, hollowed-out ulcers result. When they are situated over the ribs, they may lead, during their course, not unfrequently, to caries and necrosis of the bone, unless, as is

[1] See vol. ii, p. 300.

more probable, the gummata commenced at the bone, and, hence, caries and necrosis had already occurred before the gumma had burst.

On the buttocks, where the connective tissue, loaded with fat and of loose texture, is specially favorable to extension, gummata produce sinuous, ulcerated cavities of the size of a man's fist and burrowing collections of pus, and are liable to be complicated by inflammation of lymphatic glands, inflammation around the prostate, retention of urine, and erysipelas, and, therefore, may be attended by symptoms dangerous to life.

No special difficulties as regards diagnosis arise from the localisation under consideration. Cutaneous gummata, isolated, or when coalesced into a large node, may easily be confounded with lupus or epithelial carcinoma. The serpiginous forms closely resemble serpiginous lupus. In the latter, the individual tubercles are flatter, less firm, not so easily grasped between the finger and thumb, not so uniform in size and involution as the tubercles of syphilis cutanea ulcerosa serpiginosa. In lupus, also, there are nearly always fresh nodules, which can easily be recognised as such, present.

The well-developed forms of ulcer can scarcely fail to be recognised.

Localisation on the Extremities.

The upper and lower extremities are frequent seats of tubercular, ulcerating syphilides. As a rule, the lower extremity is more commonly affected than the arm, the forearm than the upper arm, the leg than the thigh, and the leg most commonly of all. The extensor surfaces of the elbow and knee are very often attacked. The skin and cellular tissue of the bend of the elbow, of the knee, and of the groin, &c., are not by any means exempt. The palm of the hand and the sole of the foot are much more rarely affected by ulcerating syphilitic disease than by lupus exulcerans and vegetans. On the back of the hand and the dorsum of the foot, however, gummatous, ulcerating, syphilitic eruptions are not infrequently met with.

The cutaneous gummata are generally situated on the extensor surfaces of the knee and elbow, forming groups or circles, and may persist on these parts for years, the eruption by steady peripheral

advance spreading to the upper arm or forearm, or to the thigh or leg, as the case may be.

The serpiginous, tubercular syphilide met with over these joints very seldom or never penetrates to any depth. It, for the most part, results in superficial ulcerations and thin scars, so that, even after the affection has persisted for years, the atrophy is but slight, and the joint can be extended freely.

This is the form of syphilis, especially, which has been regarded by the Norwegian physicians as a special form of disease, under the name of radesyge.[1]

The changes which are set up in other parts of the extremities, by deep cutaneous, and, especially, by subcutaneous gummata, are far more severe. They are met with, for the most part, on the middle third of the leg, but also occur, commonly enough, on the thigh, especially on its flexor surface, or in the groin, and on the extensor and flexor surfaces of the forearm.

The former, the cutaneous tubercles, when they have ulcerated, generally form kidney-shaped and serpiginous ulcers. The deeply-placed gummata give rise to ulcers and cavities, which are irregular as to position, and cutaneous and subcutaneous in the most varied combinations.

As the affection persists on the same part, for many years, fresh tubercles and ulcers, here superficial, there deeply placed, are met with; more or less considerable and extensive inflammation of the surrounding tissues ensues, around the amalgamating infiltrations; the scars resulting from past ulcers, owing to such inflammation or undermining from ulceration, accompanied by the most varied complications, such as lymphangitis, erysipelas, &c., either undergo disintegration, repeatedly, or, owing to their becoming indurated, cause obstruction to the circulation, inflammation, and necrosis of the tissues, and such attacks of inflammation are, also, in a limited or widely-spreading form (erysipelas) repeatedly set up by collection of pus beneath crusts, by traction in walking, and by mechanical or chemical (medicinal) irritation of all sorts—by all these and numerous other influences, which come into play repeatedly, and in the most varied combinations and degrees, in the course of many years, the limbs affected are much more severely impaired than is the case when other parts of the body are involved by similar, ulcerating, gummatous processes.

[1] See vol. iv, p. 132.

The change, essentially, consists in the gradual development of elephantiasis arabum, as occurs in the case of the analogous new growth of lupus.[1]

The leg is the part most frequently and soonest affected, its middle third appears thickened, covered here and there with fresh and softening, superficial, and deeply-placed tubercles, isolated and confluent ulcers and scars, the skin in relation with the ulcers being inflamed, congested, and swollen.

During the further progress of the disease, the thickening increases in degree and extent. It soon distinctly involves the bone itself, which feels uniformly or irregularly enlarged and indurated. The participation of the bone in the mischief may often be ascertained from the first, owing to the presence of outgrowths on the crest or inner surface of the tibia. In such cases, the elephantoid changes ensue all the more rapidly.

After some years, the leg has a cylindrical shape, more like that of a wooden leg; the dorsum of the foot, which, at first, was swollen out like a pillow and widened, becomes shortened, as only its anterior part, with the enlarged and, often, united toes, is distinguishable, the posterior part being almost continuous, without any interruption, with the straight part of the leg. Except in places where there are round, kidney-shaped, sinuous ulcers, with thick, prominent, indurated, or gangrenous margins, or where there are losses of substance, which are red and granulating, or whose margins and surface are ecchymosed, or where there are scars, the skin is thick and hard, or pits on pressure (œdematous) here and there, is not pliable, and is covered with epidermis which is of a dirty-brown colour, chequered, smooth, or irregular, and, here and there (in the furrows over the joints), converted into an offensive, greasy, pultaceous mass.

Fleshy excrescences, covered with crusts, or secreting a fatty discharge, easily bleeding, or fissured and hard, covered with thick, horn-like epidermis, and resembling warts, are met with, here and there, coalesced into small or large plâques, and situated on a cicatricial, sclerosed part (elephantiasis papillaris seu verrucosa), or in the middle of an ulcer.

If, in the meanwhile, owing to extension of the disease, or to the formation of gummata, caries and necrosis of some of the bones have occurred, as is commonly the case as regards the metatarsal bones

[1] See vol. iii, p. 146, &c.

and phalanges, or if exudation and suppuration have taken place within the sheaths of the tendons, the aspect of the disease becomes more complicated, various bones are lost, the toes are mutilated, the joints distorted and contracted, and dreadful deformities are produced.

Such forms of disease have not unfrequently been regarded as lepra mutilans.

The appearance of the upper extremity, under analogous circumstances, becomes wholly peculiar.

The elephantoid thickening, consisting in hypertrophy and eburnation of the bones, hypertrophic induration, and œdema of the soft parts, chiefly affects the region of the elbow, spreading from thence to the forearm and hand. The arm is misshapen, the elbow is flexed, the hand increased in size, swollen at the back, the fingers diverging from one another, claw-like, wanting phalanges here and there, and the remaining anterior ones retracted on the posterior, dorsally or laterally, or flexed and curved. The skin of the elephantoid parts is red, glistening, and stretched, or white, corpse-like, and semi-transparent, like wax, and here and there are deep, burrowing, isolated or serpiginous, round or kidney-shaped losses of substance, surrounded by œdematous or gangrenous or ecchymosed tissue, or we find ulcers with prominent margins; over the metacarpus, or some of the fingers, there may be bulging, fluctuating abscesses, covered with reddened skin, or a suppurating sinus leading to carious or necrosed bone.

The upper arm, just above the thickened elbow, is much diminished in size and wasted, consisting of little more than skin and atrophied bone. The patients become hectic, emaciated, and pale. Albuminuria, anasarca, and their consequences, mostly usher in the fatal result.

Diagnosis.

Isolated, or serpiginous, cutaneous, syphilitic tubercles on the extremities, and the ulcers which result from them, may be distinguished from lupoid affections resembling them by attending to their general characters.

It is especially to be borne in mind that, in lupus, of whatever sort, even in lupus vegetans, fresh, or, at any rate, easily recognised lupus tubercles may be found at certain parts, and, particularly,

within the area surrounded by the tubercles arranged serpiginously, or on other parts of the body. Subcutaneous gummata, before they have opened on the surface, present the same difficulties as to diagnosis in these situations, as elsewhere.

When once an elephantoid condition has become developed in a portion, or the whole, of an extremity, the difficulties as regards diagnosis are notably increased.

The ulcers situated in the midst of callous, cicatricial, œdematous tissues do not always present the characters of syphilitic ulcers so distinctly as to prevent their being mistaken for other, non-syphilitic ulcers, such as are met with in elephantiasis from other causes—ulcera e varicibus, chronic eczema, or even lupus. In fact, such ulcers are not unfrequently regarded and treated for years as "varicose ulcers."

In elephantiasis resulting from lupus, we never find ulcers penetrating so deeply as we do in syphilis.

The elephantoid thickening which we meet with confined to the anterior and inner part of the middle of the leg and associated with ulcers and tubercles, whilst the adjoining skin above and below is quite smooth, movable, and of normal condition, is invariably due to syphilis.

The mutilation resulting from caries and necrosis of some of the bones, due to gummata, or occurring secondarily (owing to the elephantoid process) has often given rise to the diagnosis of lepra mutilans in such cases, both in countries where lepra is not met with and in those in which it is endemic.[1] Such a mistake is the more likely to occur if the syphilitic gummata and ulcerations have vanished, and the elephantiasis is present alone, as an independent malady, whose origin it is then very difficult to discover,[2] and, further, the liability to error is increased by the fact that sensation is occasionally greatly diminished on parts so affected.

As regards the more particular relations of ulcerating syphilis to constitutional syphilis, and many important circumstances connected therewith, I must refer the reader to my illustrated, special

[1] See vol. iv, p. 176.

[2] In the case of a patient under care in the Clinique for Skin Diseases, who was affected with elephantiasis of the left arm resulting from syphilitic gummata and who died with albuminuric symptoms, we found a gumma in the brain at the post-mortem examination.

work on the subject, 'Syphilis of the Skin,' &c., Vienna, Braumüller, 1875, page 138-166, and Taf. l-lxviii.

The treatment of syphilitic ulcers of the skin must be conducted on general surgical principles. In addition, however, to the well-known ordinary local remedies and methods of treatment we must also, methodically and in accordance with experience, employ those specific ones which are efficient in attacking their cause — the syphilitic diathesis.

CHAPTER LX.

CLASS XI.—NERVOUS AFFECTIONS OF THE SKIN; NEUROSES CUTANEÆ.

By Professor KAPOSI, Vienna.

UNDER this term, we include those pathological conditions of the general integument, which represent an abnormal or disturbed innervation, without there being in the skin itself, or its nerves, any pathological change which can be detected or demonstrated by the means of research at present available.

This definition restricts our conception of a neurosis, as regards the skin, within narrower limits than is usual in reference to other organs and from the point of view of general pathology.

We are quite disposed also to regard as neuroses, affections of individual organs and systems which are revealed by manifest changes, as soon as it becomes clear, or plausible, that they are set up by an alteration of nervous function, and, the more so, the more we take our stand on general pathology. But it would be deceiving ourselves to imagine that one had, thereby, more closely determined the pathological condition of the affected nerves, or, conversely, had more objectively represented the pathological process in the affected tissues and systems by the suggestion of such a "neurosis." We only indicate the certain or supposed etiological influence, and not by any means the special pathology of the tissue itself, when we speak of neurotic inflammation, neurotic gangrene, neurotic exudation, &c. This more or less justifiable allusion to the supposed or actual alteration of nerve influence by no means removes the necessity of determining the character of the anomalies of nutrition and function manifest in the tissues and systems.

We must be particularly conscious of this task since it is our business to deal with the special pathology of the skin. We must also, wholly exclude from the category of cutaneous neuroses a

whole series of processes which, undoubtedly, manifest a relation to certain nervous conditions, but are apparent to us as palpable pathological changes in the tissue of the skin.

Thus, to enumerate only a few instances, herpes zoster exhibits such a relationship. In the proper place (see vol. i, p. 372, and, in still more detail, elsewhere[1]) I have discussed this matter. I am not, however, of opinion that the clinical pathology of herpes zoster would become more comprehensible if we transferred it from the group of exudative processes to that of the neuroses. Certain congenital pigmentary and warty moles show an unmistakable topographical relationship to the course of the cutaneous nerves. This applies to the warty and spiny formations of the so-called ichthyosis hystrix, but I should not, on this account, like to separate them from ichthyosis, and treat of them, independently, as nævus papillaris neuroticus or papilloma neuroticum (see p. 60, vol. iii, and 'Atlas der Hautkrankheiten by Hebra and Kaposi,' x Lief). Hebra, Langer, and Voigt have repeatedly and emphatically insisted on the special influence exercised by the distribution of the nerves on the direction taken by the acute and chronic forms of eruption, such as variola, psoriasis, and the syphilides, over and above the modifications due to the lines of fissuring and stretching (Langer[2]), and the division of the cutaneous nerves, the arrangement of the follicles (Haarwirbel, Voigt[3]), and, also, the whole conformation of the cutis (Tomsa,[4] O. Simon[5]). But the character of these processes above named is not determined in any way by this partial association with nerve influence, or altered by its absence. The place allotted to these affections in special pathology must

[1] Kaposi, "Zur Aetiologie des Herpes Zoster," 'Med. Jahrb. der k. k. Ges. der Aerzte in Wien,' 1876, 1 Heft, p. 55, und Taf. ii. Meeting of the k. k. Ges. d. Aerzte in Wien, Oct. 15, 1875; and 'Ein eigenthümlicher Fall von Zoster.,' Meeting of the k. k. Ges. der Aerzte in Wien, 1875, Nov. 5; pub. 'Wiener med. Wochenschr.,' 1876, No. 1 und 2.

[2] Langer, 'Zur Anatomie und Physiologie der Haut.' 1. "Ueber die Spaltbarkeit der Cutis," mit 3 Taf., 'Sitzungsb. d. k. Ak. d. W.,' 1861, xliv B; und 2. 'Die Spannung der Cutis,' ibid., xlv B., 1867.

[3] Voigt, "Ueber ein System neu entdeckter Linien an der Oberfläche des menschlichen Körpers," &c. 'Sitzungsber. d. k. Ak. d. W.,' 1856, xxii B. ferneres; "Beiträge zur Dermatoneurologie," &c., ibid., 1862; und "Richtung der Haare," ibid., xiii B., 1857.

[4] Tomsa, "Beiträge zur Anatomie und Physiologie der menschlichen Haut.," 'Archiv f. Dermat. und Syph.,' 1873, 1 Heft.

[5] O. Simon, 'Die Localisation der Hautkrankheiten,' Berlin, 1873.

be determined without regard to the above-mentioned relation to the nerves.

In a whole series of pathological states of nutrition and function of the skin, the nervous influence is much more definite, inasmuch as we not only find a portion of the symptoms, for instance, the localisation and mode of distribution of the eruption, determined by the nervous system, but the whole group of symptoms seems dependent on some alteration of innervation, and, indeed, would appear an impossible occurrence without it.

We must here remark that in analysing the symptoms present, we must, in the first place, take into account the threefold character of the nerves distributed in the skin, namely, sensitive, motor, and vaso-motor (sympathetic). The motor fibres have but an insignificant relation to the skin—the supply of the musculi arrectores pilorum. The other two kinds of nerve fibres, on the contrary, are distributed in all parts of the skin. Any alteration taking place, therefore, in these, individually or in combination, will of necessity cause a corresponding change in the area supplied by them—a disturbance of motor power, of sensibility or of vaso-motor influence, or of all of them combined.

The abnormalities mentioned may be caused by some affection (inflammation, hæmorrhage, tumour, degeneration, &c.) of the central organs, the brain or spinal cord, or of the sympathetic ganglia, or of a nerve trunk in its course to the periphery. Under any of these circumstances, the influence of the abnormal condition will be shown in a corresponding disturbance of function in the skin.

The pathology of these abnormalities is, at the present time, so far from clear, that, as we are dealing with dermatology, and not with neuropathology, we must confine ourselves to a few suggestions.

Under the head of disturbances of sensation, we must group the anæsthesia and algesia met with in brain disease, hemi- and paraplegia, in neuritis, neuromata in the course of nerve trunks, traumatic irritation, contusion or division of nerve trunks and branches, in lepra, and morphœa (see p. 173, vol. iv), so far, at least, as the well-known cellular infiltration of the nerves can be demonstrated to be present. Under the head of vaso-motor or trophic disturbances, we must count that large series of very various changes in nutrition, which, under similar circumstances, that is, lesion and irritation of nerve trunks, become manifest in the cor-

responding portions of skin, in the form of chronic stagnation of blood in the capillaries, erythema, cyanosis, a smooth, glistening appearance ("glossy skin" of the English and Americans[1]), dryness, or, on the contrary, copious perspiration (cold sweating), or, further, as inflammation, formation of vesicles and bullæ, or even gangrene and mummification of the paralysed or paretic portions of skin.[2]

It is quite obvious, *a priori*, that a neuritis or other affection of the nerve centres or trunks would be likely to set up disturbances of sensation and nutrition in the corresponding tracts of skin. Their mutual relationship, however, is not, as yet, clearly established. It is only certain that sometimes one form of disturbance predominates and sometimes another, or one form, alone, may be present, or all may be combined. Thus, in zoster, whose cause, certainly, is to be referred to the nervous system, in addition to the purely inflammatory and exudative symptoms met with on the skin, we may, at one time, find no complication, and, at another, there may be evident disturbances of a purely nervous character. Thus, for instance, severe neuralgic pains not unfrequently precede the eruption, or accompany it, or persist for months or years after it has disappeared; or there may be diminished sensibility of the tracts of skin affected by the eruption of zoster;[3] lastly, trophic disturbances (falling out of the teeth, or hair, or necrosis of bone) may follow an outbreak of zoster.[4]

If, in migraine, that is, neuralgia in the region supplied by the trigeminus, the skin corresponding to the area of distribution of the affected branch, for instance, the frontal, from the ophthalmic division, appears congested and hot, whilst there are drops of cold sweat standing on it, the other half of the forehead remaining

[1] Mitchel, Moorhouse and Keen, 'On Gunshot Wounds and other Injuries of the Nerves.' Philadelphia, 1864.

[2] Charcot, 'klinische Vorträge über Krankheiten des Nervensystems,' Deutsch von D. B. Fetzer, Stuttgart, 1874. Mougeot, "Recherches sur quelques troubles de Nutrition consecutifs aux affections des Nerfs," 'Thèse de Paris,' 1867. Fischer, 'Berl. klin. Wochenschrift,' 1871, No. 13. "Ueber trophische Störungen nach Nervenverletzungen an den Extremitäten. Schieferdecker, ibid., Nr. 14. Trophische Storüngen nach peripheren Verletzungen. Chowstek, weitere Beiträge zu den Vasomotorischen und trophischen Neurosen (Blasenbildung) an der Haut.," 'Wiener med. Wochenschr.,' 1875, No. 32 *et sequ* u. A.

[3] Schmidt, 'Berl. Klin. Wochensch.,' 1864, No. 11 u. A.

[4] Singer, 'Wien. med. Wochenschr.,' 1865, Nos. 56, 59.

normal, we shall fail to explain the phenomena mentioned, satisfactorily, as an independent neurosis of the skin. These symptoms form, indeed, only a part of the phenomena, and, in addition to them, we find the injection of the ciliary vessels, the contraction or dilatation of the pupil, the sickness, &c., taking an equally important share.

In the same way, we find that the changes in the skin noted above form only a part of the symptoms of, or follow after, nervous maladies, which, according to their different character and seat, may be attended by other consequences, such as muscular paralysis, aphasia, &c., in addition to the cutaneous affection. I do not think, therefore, that it would be either suitable or correct, from a clinical point of view, to separate the symptoms connected with the skin (indicating the fundamental lesion, neuritis, apoplexy, &c.), under the designation of neurosis cutis instead of looking at the group of symptoms as a whole.

There is another group of cutaneous affections, which appears to be due, exclusively, to a direct or reflex affection of the vaso-motor nerves of the capillaries and smallest arteries of the skin. Such is the case in urticaria. It is either due to reflex irritation through the gustatory nerves, or, probably, also, through the splanchnic nerves, from the digestive tract, or through the uterine nerves in disturbances of the genital functions, or from the brain, in consequence of emotional disturbances, or the wheals result directly from injury, for instance, from the bite of a flea or a scratch from a finger-nail.[1] Manifestly, the first result in these cases is that the finest vessels contract, then dilate, and remain paralysed for some time. A similar effect is produced by the direct action of cold; there is, first of all, contraction, and then, permanent paresis of the capillaries, with hyperæmia, bluish-red discoloration, serous exudation, and extravasation of the colouring matter of the blood. (Perniones).

If any one prefers to designate these processes as neuroses, or, with Eulenburg and Landois, angioneuroses[2] or trophoneuroses, he simply expresses the fact that the nerves supplying the walls of the capillaries perform their functions in some abnormal way. The

[1] I do not here include the stinging nettle, as the latter probably acts by its juice chemically irritating the nerves of the skin.

[2] Eulenburg und Landois "Die vasomotorischen Neurosen," 'Wien. Med. Wochenschr.,' 1867, No. 64, *et sequ.*

pathology of the disturbances of nutrition which impress us as a disease, the hyperæmia, the exudation, and the course of these processes, which, at one time, take the form of urticaria, at another, that of pernio, &c., that is, in fact, just those phenomena which are visible externally, and which interest us clinically, these are not at all indicated by the designation, which only points to their presumed and not demonstrated cause.

It has not, as yet, been shown how far the abnormal influence of the vaso-motor nerves is a primary element in the exudative and inflammatory processes, or whether it is not rather, in many cases at least, secondary.

That the vaso-motor nerves are invariably to be regarded as regulators of the local processes of nutrition is beyond all question. It is equally true that every pathological change is associated with vaso-motor disturbance, and that if this, alone, were considered there would be an end to special pathology. The whole of the pathological processes of nutrition must, then, be looked at from one standpoint—that of vaso-motor disturbances. According to such a view, for example, even varices would be enumerated as neuroses, as a paralysed state of the walls of the vessels is undoubtedly associated with them.

If, therefore, we do not by any means object, from the standpoint of neuropathology, or even of general pathology, to group together a certain number of heterogeneous pathological processes, as neuroses, or, in a more limited sense, as angio- or trophoneuroses, yet, from the standpoint of special pathology, and, especially, from that of dermato-pathology, we cannot follow such a course.

As we have already remarked, for our purpose, the definition of a cutaneous neurosis will be strictly limited. We include under this term only such pathological conditions of the skin as may be regarded, according to our present notions respecting them, as substantive disturbances of the innervation of the skin, that is, of the function of the peripheral branches of nerves ramifying in the skin. And we exclude from the class of neuroses all those pathological changes in the tissues, even those of the nerves (neuroma, neuritis), which can be arranged under the forms of nutritive disturbance already recognised, even though they may be undoubtedly connected etiologically or accidentally with an affection of the central or peripheral nervous system.

We are not, however, by any means of opinion that this stand-

point is infallible and unalterable in course of time. It rather follows, from what we have said, that in many affections the line of demarcation between the share taken by the alteration in the nerves and the tissues cannot be drawn, or is liable to vary with the changes in our neurological standpoint; if, for instance, perspiration is noticed to occur on the left side of the neck, from time to time, whilst the skin of the right side appears normal, the affection must be designated pathologically as hyperidrosis localis or unilateralis. If it is evident, in such a case, that the ganglia of the cervical sympathetic, on the same side, are hyperæmic,[1] then, from the standpoint of neuropathology, the affection of the skin will appear as a consequence of a neuropathy. From the standpoint of cutaneous pathology, however, it will be the more advisable, and, indeed, the only and correct plan, to pay principal attention to the morbid appearances to be detected on the skin, and make them the object of special pathology.

The number of affections of the skin to be enumerated here, and treated of under the head of "Neuroses of the Skin," will, therefore, be reduced considerably, according to the definition and reasons above given; in the first place will be excluded the well-known condition designated cutis anserina, which can only be regarded as a representative of the motor neuroses of the skin, and it has been so adduced by certain authors.

The condition known as *cutis anserina* (goose's skin, "Gänsehaut," "chair de poule") consists in a projection of the hair follicles in the form of small, firm papules, on the trunk and extremities, making the affected parts resemble, to the eye and touch, the surface of a plucked goose. Its immediate cause is a contraction of the musculi arrectores pilorum, which consist of organic muscular fibres, embracing each follicle at its base like a sling, whilst the other ends of the fibres are lost on the superficial layers of the corium, being probably attached to the papillæ, a muscular bundle branching off to the sebaceous glands belonging to each follicle. By the contraction of these muscular fasciculi, the bases of the hair follicles are lifted up, and these, together with the adjoining papulæ, the epidermis covering them, and the orifices of the follicles are made to project. The result is the appearance of papules on the surface of the skin, the centre of each being perforated with a hair or formed by a minute collection of epidermis.

[1] W. Ebstein in 'Virchow's Archiv,' 1875, 62 B, p. 435, taf. iv, fig. 4.

From these, though very much resembling them in appearance, must be distinguished those papules which are met with as persistent structures,occurring, for the most part, on the extensor surfaces of the upper and lower extremities, but also met with in moderate numbers on the flexor surfaces, in young individuals at the time of puberty, when the growth of hair on the trunk and the extremities takes on a more rapid development. Such papules represent the affection known as "lichen pilaris."

In other individuals, lichen pilaris persists, even from early childhood, representing or accompanying the lowest degree of ichthyosis.

In cutis anserina, the papules last but a short time, and affect either the whole or the greater part of the follicles of the skin. Cutis anserina resulting from contraction of the arrectores pilorum is caused by some irritation of the cutaneous nerves, whether direct or indirect.

To the direct sources of irritation, belong, especially, the impressions produced by strong contrasts, such, for instance, as changing from comparative cold to warmth, meeting a stream of cold air on emerging from a warm room, a cold douche, stepping into a cold bath, stepping from a warm bath into the comparatively colder atmosphere of the room, or, conversely, entering a too hot bath. On exposure to such sources of irritation as those just mentioned, even when they affect only a part of the body, the "goose's skin" is immediately produced, simultaneously with contraction of other groups of muscles (shivering affecting the body, the production of deep or short inspirations) and a sensation as of water "trickling" over the body, and especially along the back. If these influences continue in action, the cutis anserina, however, quickly disappears, and the other muscles (striated) become relaxed (general sensation of relaxation).

Indirect sources of irritation giving rise to cutis anserina proceed from the nervous central organs, and especially from the brain. Thus the condition of goose's skin may be excited by sudden nervous shocks, such as fright, illusory or real mental impressions, from reading or hearing of an occurrence giving rise to terror, witnessing some terrible deed, &c.

So, also, any sudden impression made on the senses, that of sight especially, of hearing, and, less frequently, of taste, may excite cutis anserina in a reflex manner, that is, indirectly through the central nervous organs. The sight of a destructive fire, of a flash of light-

ning, of something threatening danger, hearing a peal of thunder, tasting a bitter liquid, medicine, &c., will act in this way.

Since the sensation of heat and cold is also due to the exercise of one of the special senses (that of touch) the direct sources of irritation mentioned above also belong to this category. The connection, however, differs so far as this, that in the latter mode of irritation the cutaneous nerves are directly affected, and, therefore, the production of the cutis anserina is not unfrequently local.

The cutis anserina accompanying attacks of shivering in fever must be regarded as set up by the influence of the central organs.

As will be obvious from these facts, cutis anserina is due to the contraction of the musculi arrectores pilorum, and is, therefore, a physiological condition and cannot be regarded as a motor neurosis, that is, a pathological state of the skin.

The chronic pathological states of the skin resembling cutis anserina, which we have mentioned as lichen pilaris, and as a symptom of ichthyosis simplex, cannot possibly, however, be regarded as the result of contraction of the musculi arrectores pilorum, as we cannot well speak of a contraction, a tetanus of these muscles persisting for years,

English dermatologists consider the wheals of urticaria, also, to be excited by spastic contraction of the muscles of the skin. (See Erasmus Wilson, l. c., p. 269, Dr. Gull, 'Guy's Hospital Reports,' vol. v, p. 88, 1859; and Dr. Hillier's 'Handbook of Skin Diseases,' London, 1865, p. 49.)

Similarly we are obliged, for the reasons given above, to exclude from the category of the pure neuroses of the skin those processes which, from the standpoint of neuropathology, impress us as trophoneuroses, and have been already alluded to, and amongst which are the "angioneuroses" of Eulenburg and Landois.

There remains, therefore, but a limited group of pathological phenomena to be dealt with, all of them connected with the sensory nerves of the skin. We shall treat of them as—

SENSORY NEUROSES OF THE SKIN.

The sensory cutaneous neuroses either take the form of increased sensitiveness—hyperæsthesia, or of diminution or absence of sensitiveness—anæsthesia. Both may occur as merely qualitative alterations, and, as regards the first, as hyperalgesia—increased sensitiveness to certain impressions; as regards the latter, as analgesia—diminished sensitiveness to certain impressions, pressure, for instance, or diminished perception of temperature or locality, &c.

A detailed consideration of these neuroses would be of little advantage, for, owing to the circumstances which give rise to them as true, pure neuroses, they generally neither show any special arrangement, nor localisation, and alternate variously.

They are due to hysteria almost exclusively.[1]

Hasse[2] remarks, concerning this disease, "We have, here, also met with analgesia, sometimes, also, with diminution or absence of the sense of distinguishing differences of temperature. . . . It occurs most frequently during fits of hysteria, but, also, without them; sometimes, it is but transitory and very partial (commonly limited to the backs of the hands and feet); sometimes, it lasts a long time and is widespread; occasionally, it is on one side only; it appears, and disappears again, without obvious cause; psychical impressions appear to have the 'greatest influence.'

Further, as to hysterical cutaneous anæsthesia, Hasse says: "It is at present impossible to speak decisively as to the nature of this anæsthesia. Is it dependent on altered perceptivity of the peripheral ends of the nerves, or of the central organs? Is the conductibility of the nerve fibres interfered with by disturbances of nutrition? The latter is rendered improbable by the frequent changes in the symptoms during the steady persistence of the disease as a whole."

The anæsthesia may be absolute and may extend to the subcutaneous tissue. Such is the case in hysterical persons, who will

[1] We cannot include here the neuroses met with in Lepra any more than those which accompany well known affections of the brain, spinal cord and nerves, because they are rather to be considered as part of the much more important malady, than as cutaneous neuroses pure and simple.

[2] Special 'Pathol. und Ther. redig. v. Virchow,' 4 B., 1 Abth., p. 199.

allow needles to be thrust deeply beneath the nails, or may be burnt or gripped with pincers without their complaining—persons who have not unfrequently been objects of superstitious and saintly worship.

The mysterious character of these anæsthesiæ is increased by the fact that just as suddenly as they make their appearance they may vanish again or change their situation, and do not by any means correspond, as a rule, to the anatomical distribution of the nerves.

Among the alterations in the sensitiveness of the skin, which we meet with, there is one, especially, of pre-eminent interest to dermatologists. It is the sense of itching—pruritus.

The sensation of itching is not, *per se*, by any means pathological, but is a truly physiological exercise of function of the sensitive nerves of the skin, called forth by particular irritation, just as the feeling of being burnt is excited by contact with a hot body. It is so thoroughly physiological, that we should, certainly, and quite correctly, consider any skin as diseased, anæsthetic, or deficient in sensibility, in which a sufficient irritation, such, for instance, as that caused by the acarus scabiei, or by eczema, did not excite the sensation of itching.[1]

Amongst the conditions which thus excite itching, besides mechanical contact of certain kinds (tickling by means of the fingers, woollen clothes, &c.), pressure from bands (garters), girdles, bandages, &c., we also recognise certain skin diseases—urticaria, eczema, prurigo, and scabies—as associated with itching, and we have alluded to this symptom in treating of them. It is only an anæsthetic skin which could fail to be affected with itching under such circumstances.

[1] We have no explanation of the precise processes by which certain impressions on the cutaneous nerves excite the sense of itching rather than any of the other possible sensations which might be produced (pain, burning, warmth, cold, contact, &c.). Hebra appears to have approximated to the truth, when he suggests that gentle and frequently repeated impressions of short duration excite itching. This applies to the sense of itching caused by tickling. The itching set up by varicose veins of the legs, Hebra explains in an analogous manner, as due to the mild and frequently repeated irritation caused by the blood in the smallest vessels, sometimes flowing slowly, sometimes more quickly, on the papillary nerves. Of the itching met with in eczema and prurigo, we have no plausible explanation, since under precisely similar anatomical conditions, such as lichen scrophulosorum, pemphigus, &c., or where there is cellular infiltration into the corium and the papillæ, as in syphilis, lupus, &c., no sense of itching is produced.

There is, however, a pruritus of the skin which arises without any such causes, is a substantive disease, and will, therefore, be recognised by us as a true neurosis of the skin under the name of

PRURITUS CUTANEUS.

History.—We have already, in treating of the disease named by us "Prurigo," and regarded by us as a distinctly typical and characteristic form of disease (see vol. ii, p. 253), furnished the historical data which make it quite evident that until the time that we (Hebra) had firmly established clear ideas in regard to both these pathological conditions, the terms prurigo and pruritus had been, by the great majority of authors, either used indiscriminately or, at least, had not been sufficiently distinguished from one another.

We will only lay particular stress on what we have said, in the historical account given at that part of this work, showing that though the greater number of authors used the terms pruritus and prurigo promiscuously for all cutaneous affections associated with itching, with or without visible pathological changes, still there were writers who reserved the name pruritus, exclusively, for a cutaneous affection which consisted, solely, in the abnormal sensation of "itching," the skin showing no visible pathological changes, such as pustules, papules, or wheals, which could give rise to the itching. Thus, Galenus defined pruritus as an itching sensation in the skin, caused by the excretion of some refuse material. Mercurialis, who is not usually a model to be copied in dermatological pathology, writes still more definitely: Preterea in aliis affectibus, qui junctum habent pruritum, a cute semper emanat aliqua sanies, in pruritu nihil emanat. And Hafenreffer, so often referred to in the literature of scabies, gives a definition truly classical in his own time and acceptable in our own: Pruritus est tristis sensatio desiderium scalpendi excitans, sine cutis asperitate vel exulceratione. In spite of this definition, which would fit in with our ideas, the further description given by these authors shows that they included under the name pruritus all sorts of cutaneous maladies associated with itching, just as did Willan, though with certain restrictions. Instead of pruritus, however, he substituted the class prurigo.

Under prurigo, which he subdivided into mitis, formicans, senilis,

and localis, Willan not only included an affection (mitis and formicans, prurigo c. papulis) which would correspond to our own idea of prurigo, but, also, an affection (senilis et localis, prurigo sine papulis) which will in some measure correspond to our notion of pruritus. But only in part, for Willan manifestly includes under prurigo senilis the itching which results from epizoa (pediculi vestimentorum)—an idea which led him, as well as later authors, to make a subdivision—prurigo pedicularis (!) (psoride papuleuse pediculaire, Alibert.)

The later English (Green, Plumbe, Hillier, Wilson) and French authors (Devergie, Rochard, Gibert, Chausit, Cazenave, &c.) are aware of the fact that there is a prurigo of the skin which is a substantive affection, as they, like Willan, oppose the prurigo cum papulis to a prurigo "sans papules," but they confound the affections with one another, since they, for example, sometimes place the prurigo podicis amongst those "cum" papulis, and sometimes amongst those "sine" papulis, not to speak of the prurigo pedicularis, which all mention, though it is neither a prurigo nor a pruritus.[1]

Definition.—By pruritus (cutaneus) we mean a chronic affection of the skin which consists, solely, in a sense of itching, lasting for months or years, there being either no eruption or other change, whatever, visible in the parts of skin affected, or only such as are clearly due to scratching, which is in every case caused by the itching.

The symptoms, etiology, and significance of the pruritus vary according to the localisation of the malady, and, in this respect, we must distinguish (1) a pruritus universalis and (2) a pruritus localis.

[1] See p. 346, vol. i, and Hebra "Ueber die sogenannte Läusesucht," 'Wiener Med. Presse,' 1865.

1.—PRURITUS UNIVERSALIS.

This consists in an itching of the skin all over the body.

The affection developes gradually from imperceptible beginnings and without any obvious cause. The person affected generally has his attention first called to it, when the itching and a group of symptoms connected with it, for the most part subjective, have already existed, or been slowly increasing, for many days or weeks.

The sole characteristic symptom is the subjective one of itching. It comes on many times during the day, lasting for a varying period. During the intervals (longer or shorter) the patients are wholly or almost wholly free from irritation.

The most constant and the severest attacks occur in the evening, or during the night. Whilst the patient is undressing to get into bed, itching begins on the trunk or extremities, and, especially, on those parts which are subjected to pressure by belts, garters, braces, &c.; it is, at first, very slight, but gradually becomes more and more severe. At first, the patient tries to ignore the slight irritation, then, he seeks relief by rubbing gently with the tips of the fingers; soon, however, he plies his finger nails energetically. The itching increases and spreads in proportion to the scratching. It traverses the whole body like a flash of lightning; it is, now, here, now, there, now, in one spot, now, in several at the same time. Before long, the unhappy patient has not hands and fingers enough to attack all the affected parts. He tears up the skin in long streaks wildly with all his might, his sole object being to attack the annoyance as energetically as possible, and is not content till his nails have penetrated sufficiently deeply into the so terribly itching part. For, where a bleeding or almost bleeding excoriation has been produced and a burning sensation is caused, the infinitely more tantalising sense of itching abates.

After the torture has lasted for half an hour or so, the itching moderates. The burning and pain caused here and there by the scratching with the nails, the glowing sensation, the increased sense

of warmth over the whole body, are certainly comforting in contrast to the violence of the itching and its rapid changes from place to place and the accompanying general nervous irritation.

The patient goes to bed. He soon sleeps. Unfortunately, however, it is only for a short time. The warmth of the bed soon starts the itching afresh. In many patients it is only under such circumstances that a violent attack occurs, which may last from an hour to several hours. They toss about uneasily in bed. They often spring up out of bed, in spite of the strongest exercise of self-control, as if stung by tarantulæ, unable to restrain themselves any longer, and proceed to scratch the skin furiously, whilst parts which they cannot reach with their nails, or not quickly enough, they try to cool by contact with cold bodies, the wall, the stone floor, &c., until, at last, they return to bed and obtain a certain amount of rest.

Even when asleep, they are not wholly free from torment. It influences their dreams in the most varied and extraordinary shapes. Sometimes the poor fellow believes that he is stroking his favourite dog, and, as this pleases the dog, he goes on stroking, at first gently and then by degrees with more and more energy, till he uses his nails freely. He gets quite out of breath with scratching and cannot by any means abstain; then he wakes up suddenly and finds that his favourite hound was his own skin, and proof that he has really only been scratching this in his dream is afforded by the number of smarting and burning excoriations.

Another time, he dreams that he has to rub or polish the floor or to scrape the walls. The visions are always analogous and concern his own diseased skin.

It is only towards morning that the disturbing sensations abate and quiet sleep follows, of too brief duration to give to the patient, so sorely tormented, the requisite physical and moral refreshment. The most tranquil hours are those in the early morning. In the course of the day, more or less irregular attacks, of unequal duration, occur, either spontaneously or in consequence of some exciting cause. Among such, may be enumerated bodily and mental excitement, mental influences of a sudden and unpleasant character, such as anger, impatience, compulsory continuance in a particular occupation, or in a special locality, at the theatre, in company, the consciousness of the compulsory position, the fear even of an attack, the mere thought of the possibility of an attack, and the inconveniences which must attend it in a strange place—mostly psychical influ-

ences—any of these suffice to excite itching, at first mildly, then more severely, and ultimately a thorough attack.

The impetus scabendi, the desire to scratch, is irresistible. The greatest moral efforts are without avail to overcome it. The longer it is suppressed, the more overpowering it becomes, till all regard for other considerations and the restraints imposed by companionship are set aside. In the midst of conversation, or during a performance at a theatre, a patient affected with pruritus is compelled to run away, regardless of the construction put on his conduct, in order to find some lonely place where he may revenge himself with his nails, on his skin, which is causing him such torment.

This tormenting agony, these constant interruptions to the equanimity and self-control so necessary for business and friendly intercourse, not unfrequently deprive the patient of all moral support and energy for resisting the twofold, moral and physical torment. In the acme of the excitement of an attack, or under the influence of the melancholia, and misanthropy resulting from isolation, many a patient suffering from pruritus has been led, with the courage of despair, to put an end to his troubled existence.

The objective symptoms in pruritus universalis consist, merely, in irregularly distributed results of scratching, recent and of some standing, in the form of crusts and brownish-red, dark-brown, or brownish-black, pigmented patches, arranged in stripes or combined in the most irregular manner. In addition, the skin is pale and shrivelled, perspires but little, and is deficient in subcutaneous fat. Here and there, are the insignificant beginnings of a squamous or pustular eczema.

After the disease has lasted for some time, its deteriorating effects, and, especially, the influence of the sleeplessness, become evident in the general malnutrition, or it may be that the malady causing the pruritus has advanced and causes the disturbance of nutrition. The patients emaciate more and more, become marasmic, and, finally, die from some complication which may be of a most varied character.

Etiology.

Though we are familiar with some of the causes leading to the production of pruritus universalis, yet, even in the case of these, we are quite unacquainted with the particular connection which exists between them and the peculiar irritation of the papillary nerves.

The cause most generally acknowledged, and one which may be regarded as typical in its way, is marasmus senilis. The itching due to this condition has long been recognised, and since the time of Willan has been treated of by authors under the term pruritus senilis.

Pruritus senilis does not differ in any of its symptoms from pruritus universalis due to other causes. It is solely its association with the general symptoms of senile marasmus, or, even, in many cases, merely the advanced age of the patient which seems to stamp the affection as pruritus senilis, the marasmus not being by any means a prominent symptom. The pale, shrivelled state of the skin is now and then not at all specially marked. That a man sixty or seventy years of age should begin to decline comparatively rapidly in his state of nutrition, under the influence of the ills contingent on pruritus senilis, is to be expected *à priori*. Life may, however, be prolonged for many years. The pruritus senilis persists throughout its whole duration. The malady is incurable.

The proximate cause of the pruritus senilis may be found in the structural changes to which the tissue of the skin as well as that of most other organs is subject, and the peculiarities of which have been already so fully described by O. Weber. In what way, however, the most peripheral ends of the nerves become affected by the senile atrophy and disposed to take on the abnormal sensation of itching is as yet quite unknown to us.

In addition to senile atrophy, we partly know and partly suspect pruritus senilis to be caused, in middle-aged persons, and especially in men between forty and fifty, by chronic indigestion (gastricismus), accompanied by the symptoms of oppression over the gastric and hepatic regions, enlargement and sensitiveness of the liver, costiveness, heartburn, loss of appetite, general feebleness, lassitude, and mental inactivity.

In women of middle age, pruritus universalis appears, in most cases, to be referable to functional change in the utero-genital system, partly of a physiological and partly of a pathological character. Thus, in certain women, we have known pruritus to occur with each pregnancy, subsiding after delivery, only to reappear during a subsequent pregnancy.[1]

[1] An analogous condition to this is met with in those pemphigoid affections which are observed to recur at each pregnancy in certain women (*vide* Hebra, 'Wr. med. Wochenschrift,' 1872. No. 48), for there appears to be an homology

In the greater number of the female patients affected with pruritus, the latter appears to be caused by disturbances of the sexual functions, of a pathological character, but not of any great importance, and when they pass away the irritation of the skin also disappears, either permanently or temporarily. Amongst such disturbances, may be enumerated dysmenorrhœa, amenorrhœa, chronic infarction, sterility, and especially those changes which usher in the climacteric period.

In both sexes, albuminuria, chronic Bright's disease, diabetes mellitus, tuberculosis, cancer of the liver, or of the stomach, or (in females) of the uterus, and various other new growths, may set up pruritus cutaneus. These causes are the most positive of those enumerated and it not unfrequently happens that from the pruritus we may suspect albuminuria or diabetes, and by examining the urine establish the diagnosis at a time when the patients may show no other signs of their renal maladies.

How far the cutaneous irritation in cases of albuminuria or glycosuria is set up by excretory materials, or their products of decomposition, deposited in the skin, the present state of our knowledge no more enables us to determine than to explain why, in certain cases of moderate jaundice, the most violent prurigo may be present, whilst, at another time, in severe jaundice, it may be wholly wanting, or does not make its appearance until the colouring matter of the bile is becoming absorbed again and is disappearing.

It also seems to be probable that depressing psychical affections of long standing, such as urticaria chronica, may excite pruritus cutaneus.

Prognosis.

It is only in pruritus senilis that we are obliged to consider the prognosis absolutely unfavorable. The affection is incurable and lasts for the remainder of the patient's lifetime. The forms of pruritus belonging to the earlier periods of life and caused by the influences already mentioned are curable in proportion as their causes can be removed, or may even improve without the latter being wholly eradicated. The same remark applies to the cases of pruritus whose etiology in particular individuals cannot be discovered. Still, in all cases, the duration of the malady is prolonged.

between pruritus cutaneus and pemphigus, in general, and not merely in relation to the similarity of their predisposing influences. In "pemphigus pruriginosus" this appears to me also indicated distinctly enough pathologically.

Not only does the latter circumstance compel great caution in prognosis, but, also, we cannot disregard the fact, shown by experience, that many of the cases of pruritis occurring in middle life prove uncommonly obstinate, or even incurable; or we find that, in the course of years, cancer of the stomach, liver, or uterus, becomes developed in these cases.

Diagnosis.

Owing to the transitoriness of the objective symptoms met with in pruritis universalis, and the fact that the symptoms are, for the most part, those dependent on itching (pigment streaks and patches), we are driven, in this affection more than in any other dermato-neurosis, to trust, for diagnostic purposes—to the subjective symptoms, that is, the itching, the mode of its manifestation, its duration, intensity, &c.; in short, we trust, in great measure, to the account given us by the patient. We are not, however, by any means wholly dependent on the latter. On the contrary, however positively a patient stated that for weeks or months he had several times daily suffered from a severe and persistent itching, we should still, before accepting his statement, expect to find objective confirmation of it in the number and severity of the recent and old excoriations and their remains—pigment streaks and patches; and, on the other hand, such a state of affairs would render any statement on the part of the patient unnecessary, for the presence of numerous scattered excoriations and pigmented patches left by such excoriations would enable us to feel quite sure that itching of the skin had existed for a long period.

The diagnosis of itching of the skin, however, does not by any means necessarily imply that of the neurosis, pruritus cutaneus. All the circumstances of the case must first of all be carefully weighed, in order to establish the fact that the itching of the skin is not a symptom of some "itching" skin disease, but a substantive, independent malady.

This is, however, by no means an easy matter, and we cannot always settle the point at once.

There is no great difficulty in excluding prurigo and scabies. In urticaria chronica, however, diagnosis is less easy, for in this disease, as in pruritus cutaneus, the trunk is the part most severely affected with itching, and, therefore, showing most evidences of excoriation, and the causes at work are similar in the two diseases. The same remark applies to pemphigus pruriginosus, for the physician may

be quite unable, for long periods, to demonstrate the existence of a bulla, and may only find excoriations. The patients may, for instance, scratch themselves in a part just becoming congested, or at the seat of a wheal, where a bulla should develop, and the latter may fail to do so when the epidermis has been destroyed. The occasional appearance of wheals is neither conclusive as to the presence of urticaria chronica, or pemphigus chronicus, nor as to the absence of pruritus cutaneus, for, under any circumstances, severe scratching (as in scabies, prurigo, &c.) may produce isolated wheals occasionally.

It is, probably, more correct to say that, in the majority of cases, it is only after prolonged observation that we can establish the diagnosis of the malady and differentiate it from the two affections mentioned, and that it is only in a few cases we can speak positively at once.

To avoid overlooking an important feature in the case, and for the sake of completing the diagnosis, as well as for the sake of treatment, it is necessary to examine for the presence of any of the causes above mentioned—morbus Brightii, chronic gastricismus, &c.

It will be found much easier to guard against confusing pruritus cutaneus with itching which is due to urticaria acuta, urticaria et excoriationes e cimicibus et e pediculis vestimentorum.

2.—PRURITUS LOCALIS.

Pruritus localis, in the form of a neurosis, is confined almost exclusively to the genitals and anal region, and the adjacent portion of mucous membrane. Occasionally, pruritus localis may also be met with on other parts of the body, especially the palm of the hand and the sole of the foot. Still more rarely, but quite as certainly, pruritus may be localised on other tracts of mucous membrane as well as those mentioned, and, especially, on the tongue and the urethra. The two forms first mentioned are of especial interest practically, and for this reason we shall deal with them in greater detail.

PRURITUS PUDENDORUM MULIEBRIUM.

(*Pruritus vulvæ et vaginæ. Itching of the female genitals.*)

For a long period, the affection presents no sort of objective symptoms by which it can be recognised. The malady is characterised, solely, by the subjective symptom of itching complained of by the patient.

The itching, here, also, comes on in paroxysms many times in the course of the day, and is aggravated at night time. It is confined to the genitals, the inner surfaces of the labia, the mucous membrane of the commencement of the vagina and the clitoris. The intense distress which the affection causes the patient scarcely admits of description. The strong desire to scratch leads the patient to adopt the most harsh and violent means of allaying the itching, by scratching, rubbing, pressure, &c. Despite these manipulations, the attack of itching often lasts from half an hour to several hours, and then gradually ceases. A severe burning sensation in the parts which have been most intensely irritated, a sense of heat in the genitals, congestion of the mucous membrane, and increased secretion of mucus follow such an attack.

That patients, owing to the special locality exposed to irritation, come to resemble onanists, or those affected with nymphomania is easily understood. Thoroughly chaste women suffer no little mental anguish from this suspicion so easily cast on them. That, as a matter of fact, one or another may occasionally long for real coitus instead of friction against inanimate objects, or appear to wish for it, is the more comprehensible because the irritation of a slight pruritus of the genitals may kindle the specific sexual irritation and the patients hope that by relieving the latter they may also mitigate the horrible sense of itching. But such a manifestation is not in any way an expression of nymphomania or of increased sexual excitement in general. For completed and sufficient coitus does not lead to the cessation of the itching.

As in the case of pruritus universalis, so, also, in localised pruritus pudendorum muliebrium, the malady persists for a long period, for months or years. In progress of time, we also find the same local

objective consequences of frequent and intense scratching and friction. They consist of thickening of the labia, a dryness and want of pliability of the hypertrophied and darkly pigmented epidermis, of excoriations, and of eczematous symptoms of a more or less severe character.

The mucous membrane of the vagina gradually becomes permanently hyperæmic; it is of a dark-red colour, hot to the touch, and secretes a copious, muco-purulent discharge; occasionally, there is pronounced vaginitis.

The general condition of the patient deteriorates under the influence of the local malady. The sleeplessness and the constant, intense, nervous excitement interfere with the state of nutrition. Loss of appetite, want of animation, and depression of mind and spirits unite with the obstinate and wearing physical malady in estranging the patient from companionship and family, and even excite disgust of life itself.

This is still more likely to be the case if, as occurs in some patients, during the paroxysms of the pruritus, or in the intervals, hysterical symptoms, attacks of laughter or weeping, muscular convulsions, and the like come on.

Etiology.

We know very little as to the cause of pruritus pudendorum muliebrium. Occasionally, derangements of the sexual functions, similar to those mentioned under pruritus universalis are at the foundation of the malady, for instance, dysmenorrhœa, the onset of climacteric changes, sterility, chronic ovaritis, new growths in the internal genital organs, and, in girls, not unfrequently, helminthiasis. We ourselves have met with several cases in which pruritus pudendorum, lasting for several years, proved to be the precursor of carcinoma of the uterus, which subsequently developed. Possibly, similar cases may be known to many. It is common enough, however, for us to be quite unable to assign any cause for the pruritus pudendorum muliebrium, and we are also, as a rule, quite ignorant of the physiological explanation of the intimate relation between the supposed cause and the affection.

Diagnosis.

The diagnosis of the disease under discussion must depend, simply and solely, on the history of the patient and prolonged observation, since any specific objective signs are wanting. We must note that it is well to avoid the negative error of diagnosing pruritus where the itching is simply a symptom of chronic eczema of the labia, or of eczema marginatum. Such an error is very easily made, because pruritus after it has lasted some time leads to an eczematous condition of the labia. The result of treatment will clear up the matter. In eczema, treatment will result in complete disappearance of the itching when the labia have resumed their usual appearance. In pruritus, the itching will not diminish to any marked extent, even though the labia may have become quite normal.

PRURITUS PUDENDALIS MARIUM.

Pruritus of the male genitals is a rare malady. The itching is, as a rule, chiefly complained of in the scrotum and perineal region. In a few patients, itching may be felt at the meatus, or even along the whole length of the urethral mucous membrane. We have repeatedly found such itching to depend on eczema of the scrotum, and feel sure that many cases of so-called pruritus are really to be regarded as eczema, and, in fact, get well as soon as the eczema is cured. Now and then, nevertheless, cases of real pruritus do occur. In intensity, troublesomeness to the patient and in its consequences, the malady, however, does not by any means equal the forms of pruritus already mentioned.

PRURITUS ANALIS.

Itching, in the form of a neurosis, more commonly attacks the anal region. It affects the skin around the anus and the adjacent mucous membrane of the rectum. From thence, the itching may spread along the perineum, and be associated with pruritus of the scrotum, and of the mucous membrane of the urethra. The itching is in the highest degree troublesome, compels the patient to scratch very energetically, comes on in paroxysms, especially before and after defæcation, or when the patient is compelled to sit perfectly quiet for a long time.

If we set aside the cases where, in young people, the anal pruritus is set up by the presence of lumbrici, or (even in adults) by oxyurides in the rectum, pruritus analis will be found to occur almost exclusively in older patients of the male sex. Here, after long continuance, it will be found associated with more or less severe eczema of the skin of the perineum. This makes the diagnosis somewhat difficult, for, in a given case, it will be hard to say whether the eczema is not really the disease, and the itching merely an accompanying symptom. The diagnosis will only be rendered certain by observation of the case for some time, and the result of appropriate treatment.

Undoubtedly, pruritus analis very often depends on a varicose state of the veins of the rectum, just in the same way as we found that varicose veins in the leg set up itching; and, though we so often find it necessary to protest against attributing all sorts of chronic eruptions to hæmorrhoids, this is not the case as regards pruritus analis, for, on the contrary, we are ourselves compelled to associate it with hæmorrhoids and the accompanying follicular swelling of the mucous membrane of the rectum, and, also, the catarrhal hypersecretion of the latter.

At the same time, the purely neurotic character of pruritus analis cannot, however, be wholly maintained, or, at least, not in all cases.

The prognosis in pruritus analis is, practically, comparatively hopeful, for, in most cases, the condition mentioned may be cured or improved, and, at the same time, the itching may be stopped or diminished.

PRURITUS PALMÆ MANUS ET PLANTÆ PEDIS.

Pruritus of the palms of the hands and the soles of the feet is rarely met with. These parts may be affected at the same time, or separately, but, invariably, symmetrically, and sometimes with, and sometimes without increased local secretion of sweat (hyperidrosis palmæ manus or plantæ pedis). The cases which have come under our own observation were not specially severe, and appeared to be rather of a transitory character, though lasting for months. Cases, however, do occur of an extremely severe and tormenting nature, as Alibert has recorded in one case which came under his own notice.

Still more rare than pruritus of the palms of the hands and of the soles of the feet is the itching met with on particular parts of the mucous membrane, such as of the tongue. We, of course, do not include the mucous membrane of the female genitals and the rectum, for, on the contrary, as we have already mentioned, they are frequently affected with prurigo.

Under the term PRURITUS HIEMALIS, Duhring[1] has described a form of itching of the skin, which must also be regarded as a neurosis, and which comes on every year, in those who are disposed to it, about the time of winter. Sometimes, the itching is but moderate, at others, it is fairly severe, affects the lower extremities, chiefly the flexor surfaces, and parts where the hair is scanty, comes on regularly at night, on undressing, and persists for some hours. During the day, the itching is slight, or absent altogether. At first, there may be nothing abnormal to be seen on the affected parts of the skin. The skin is smooth, thin, supple, or in some cases, somewhat dry. Subsequently, in consequence of scratching, all kinds of excoriations, pigment streaks, enlargement of follicles, scaliness,

[1] 'Pruritus hiemalis, an undescribed Form of Pruritus.' By Louis A. Duhring, 'Philadelphia Medical Times.' Reprint, 1874. (See, also, "Winter Prurigo," in 'Lectures on Clinical Surgery,' by Jonathan Hutchinson. Vol. i, part 1, Lecture VII, p. 100; and "Summer Prurigo" (Prurigo Æstivalis, *seu* Prurigo Adolescentium, *seu* Acne Prurigo)," Lecture IX, p. 126. Various points connected with the subject of prurigo are discussed in Lecture II, p. 15; Lecture V, p. 75; Lecture VI, p. 79; and Lecture VIII, p. 110).—TR.

&c., are met with. As soon as the mild season comes round the malady disappears, to return with autumn.

I agree in the main with Duhring's account. We also find, here, in our climate, that many persons are affected with itching during the cold periods of the year, and, subsequently, show excoriations and eczematous symptoms in consequence of scratching. We cannot, however, so definitely localise the affections. We find that itching is distributed tolerably uniformly over the body, but commences mostly on parts subjected to the pressure of bandages, such as the hips, and where the garters are applied. We, also, often see eczematous symptoms make their appearance at the same time as, or very soon after the itching, usually in the form of eczema papulosum or eczema sudamen.

Like Duhring, I am disposed to consider the cold as the cause of the itching and of the eczema subsequently developed, but only indirectly. In many persons, the skin, under the influence of a cold and dry atmosphere becomes dry and rough. I believe that it is this latter condition of the skin which forms the special and immediate cause of the itching and scratching, and that the cold is to be regarded as a remote cause merely.

Itching and a wholly analogous state of the skin become established when the epidermis has been from other causes persistently deprived of fat, and has become dry and hard, as happens, for instance, after daily soaking in cold water or washing with soap.

I should certainly prefer, as being a more natural arrangement, to class the affection designated pruritus hiemalis by Duhring (and which is undoubtedly observed here) with those other conditions which are set up by known causes, are, also, attended with itching at first and then induce eczema. Thus, itching from varices, sweating, mechanical pressure, scratching, contact with water, soap, &c., any condition which first of all causes itching and then eczema.

I am, therefore, compelled to place Duhring's pruritus hiemalis in the same category as the processes last named, without, however, in the least wishing to detract from the merit of this author's work.

Treatment.

A malady such as that just described which, whether in the form of pruritus universalis or localis, afflicts the person affected with the

tormenting and highly disturbing sensation of itching, and persists, as a rule, for years or a lifetime, makes great and continual demands on the therapeutic art. In many cases, treatment is successful, in others but partially so, or wholly ineffectual.

Attention must first of all be directed to the discovery of the cause of the pruritus. So far as this can be made out and removed by appropriate treatment, we may expect to be able to cure the pruritus.

We have already mentioned, among such causes of pruritus, chronic enlargement of the liver associated with symptoms of indigestion, constipation, weight in the region of the stomach, and nausea. In such cases we have repeatedly known benefit follow resort to Karlsbad or Marienbad, or the use of the waters obtained from there (Sprudel, Mühlbrunn, Kreuzbrunn). Occasionally, it was necessary to repeat the "cure" in the following year or even again before permanent relief was obtained. A single employment of such a "cure" for six or eight weeks in the cases under discussion had a most beneficial effect on the malady. After going through the cycle of the thermal or drink cure, or in cases where such could not be carried out, the methodical administration, according to individual cases, of soda, magnesia, rhubarb, amaricantiæ, and a careful regulation of the diet, are necessary and often beneficial.

In reference to the other causes of pruritus, whether general or local, before mentioned, such as diabetes, morbus Brightii, the various affections of the uterus and ovaries, we can make much less definite statements. In all such cases, the result of a careful and skilful examination will indicate the line and means of treatment.

In all cases, whether the cause of the affection be discoverable or not, the harassing symptom of itching must be dealt with in order to relieve the patient for the time, and especially to afford sleep and rest at night.

Unfortunately we have no very trustworthy remedies to depend on for this purpose. They are not, however, to be neglected, for sometimes one and sometimes another will, in some measure, or for a certain time, answer our expectations, and the great sufferings of the patients will constantly compel us to renewed attempts.

In the first place, we must call attention to the fact that the remedy, *par excellence*, which is of such avail in the so-called pruriginous dermatoses, in eczema, and prurigo, that is, tar, seems almost inert against the itching of pruritus cutaneus.

In this disease, as a rule, only those remedies avail, even for a

time, which quickly withdraw heat from the skin, and, possibly, affect the cutaneous nerves by the sense of coldness, or cause, at the same time, a local, relative anæsthesia or narcosis.

In the first category, will come cold, wet packings, after the plan of the cold-water cure, cold douches once or several times in the day; painting or washing the skin several times daily, and especially at the commencement of an attack of itching, with vinegar, vinegar and water, alcohol, ether, in convenient combinations either with or without the addition of carbolic acid, salicylic acid, creosote, &c., somewhat after the following formula:—℞. acid. Carbol., scrupulum (1·50 grms.); Spir. Vin. Gall., unc. sex (300·00); Glycerinæ, drachmam (5·00); or, Ætheris Petrolei, drachmam; Spir. Vin. Gall., unc. sex; Glycerinæ, drachmam; or, Ætheris Aceti, drachmam ad unc. sex alcoholis, &c., &c. The parts of skin which have been painted with the above-named or analogous fluids, should be dusted over with powder while still damp, so as to prevent the drying up of the fluid somewhat, and prolong its cooling and soothing effects as much as possible.

Warm baths, in certain cases, produce a marked alleviation of the individual attacks, and, if persisted in, a general improvement. In other cases, the warm bath causes such an aggravation of the itching that it becomes unbearable, and the patient leaves the bath in the greatest excitement.

Occasionally, the addition of certain remedies to the bath, such as soda (1—2 lbs. for a bath), or corrosive sublimate (1—2 drachms), has a beneficial effect. In the latter case, care must be taken that salivation is not produced.

In the various forms of pruritus localis, the remedies and applications mentioned are either inapplicable or must be modified to suit particular circumstances.

In pruritus vulvæ et vaginæ, cold or warm hip baths, with or without the douche, or the addition of medicaments (soda, sublimate, alum), prove serviceable. In addition, injections into the vagina, of simple water, lukewarm or cold, solutions of zinc, alum, or tannin, must be tried. The plan of constantly cooling the vagina by means of the so-called vaginal cooler is not to be despised. It consists of a caoutchouc tube several feet in length, to which is attached a conical metal tube about four inches in length, with a blind extremity, and connected to the caoutchouc tube in such a way as to divide it into a longer and a shorter portion. When in use, the

metal portion is inserted into the vagina, whilst the patient is in a semi-recumbent position. The shorter portion of the tube is dipped into a vessel placed at some hei ght above the patient, filled with cold water, and containing from 5 to 10 litres (1 to 2 gallons). The long end, provided with a stop-cock, hangs down into an empty vessel placed on the floor. Before using the apparatus, it is necessary to empty it of air, and then the water will flow from the higher vessel. It will pass through the metal portion and reach the lower part of the tube. The tap is now turned. The metal portion is inserted into the vagina and the tap opened. The water flows in a continual stream, and as it passes through the metal portion will have the effect of cooling the vaginal walls and allaying the itching.

It is obvious that, with the view of alleviating and cutting short individual attacks, or the disease as a whole, we shall, also, either from time to time, or methodically (daily, every evening), frequently have to employ opiates topically, or internally; in the former manner, as suppositories placed in the vagina or rectum (℞. Butyr. Cacao, scrupulum (1·50), Opii pur., gr. $\frac{1}{4}$—$\frac{1}{2}$ (0·2—0·4); or Ext. Bellad., $\frac{1}{4}$—$\frac{1}{3}$ gr.; or Morphiæ, $\frac{1}{6}$—$\frac{1}{4}$ gr.); or in the form of subcutaneous injections; internally may be used morphia, laudanum, chloral hydrate, inhalations of chloroform, ether, &c.

The treatment of pruritus analis must be conducted on analogous principles. In addition, however, to narcotic or creosote or camphor suppositories, clysmata of cold water, or water with vinegar, carbolic acid, salicylic acid, and the like, will frequently be found useful.

It is scarcely necessary to mention that both in pruritus analis et vulvæ, an eczema which may become developed on the skin surrounding the anus, labia, or perineum, must be treated at the same time, *secundum artem*.

Of internal remedies, which, notably or successfully, act directly on pruritus universalis or localis, that is, without affecting the cause of the disease, we have none whatever to mention. Arsenic, especially, does not seem to have any influence. On the other hand, in certain cases, even of prurigo senilis, we have undoubtedly observed a diminution of the itching under the administration of carbolic acid, internally, in two-grain pills, from 10 to 16 grains being given daily. Even in these few cases, however, the effect was but transitory.

CHAPTER LXI.

CLASS XII.

PARASITIC DISEASES OF THE SKIN, DERMATOSES PARASITARIÆ.

By Prof. KAPOSI, Vienna.

General Remarks on Parasitic Skin Diseases.

A LARGE proportion of cutaneous maladies are due to the influence of parasitic organisms. In a natural classification these affections would be grouped together under the head of parasitic dermatoses.

So far as the pathological changes in the tissues and disturbances of the nutrition of the skin are concerned, these maladies do not differ in any essential particulars from those described in the foregoing pages. For, the symptoms of hyperæmia, exudation, inflammation, &c., are common to all of them. But this group of diseases of the skin is distinguished by the fact, that the special influence which gives rise to them comes prominently into notice in a most peculiar manner, inasmuch as it is an essential constituent of the group of symptoms characterising the disease, and, occasionally, may, in fact, alone, form the chief feature by which the disease is recognised.[1]

These parasites must, therefore, be regarded in a twofold aspect: as the cause of the disease, and as an essential constituent of the group of symptoms of the morbid processes set up by them.

They do not, like the symptoms of hyperæmia, exudation, in

[1] This removes, in great part, the objection to Hebra's classification arising from the fact that his first eleven classes are founded solely on pathological anatomical changes, whilst the twelfth class is based on the cause. The cause, however, here forms an essential part of the group of symptoms of the disease, and is, therefore, not only the cause, but, also, essentially, a symptom; for instance, the favus crusts are symptomatic of the disease known as favus, for it is favus only so long as the favus fungus is present.

short, the well-known pathological tissue changes, represent a functional product of the human organism, but are wholly separate and external independent natural objects. We must, therefore, first of all, obtain a knowledge of their natural peculiarities, if we wish to understand the morbid processes set up by them.

The parasitic organisms which come under our notice as setting up diseases of the skin in the human subject are partly vegetable and partly animal, so that we must describe, 1. the vegetable parasites; and 2. the animal parasites.

1. THE VEGETABLE PARASITES WHICH GROW ON THE HUMAN SKIN.

General Remarks on the Vegetable Parasites.

Until about fifteen years ago, it seemed an easy matter to give a comprehensive account of the characters of the vegetable parasites found on the human skin, and their place in natural history. Until then the descriptions of their characters were tolerably simple. They were confined for the most part to their morphology, the physical peculiarities which they presented to the observer at the part they attacked, the human epidermis.

During the last fifteen years, all this has been greatly altered. The material accessible, hitherto comparatively slight in amount, easily grasped, and diminishing somewhat on strict investigation, has since grown in an astonishing degree to almost uncontrollable dimensions. Modern investigation into the causes of various diseases has gradually brought to light new organisms, which give rise to forms of disease, and call for elucidation of their natural history.

Though the results of investigations then obtained, primarily and ultimately concern medical pathology, the latter cannot deal with them exclusively. The collateral science of botany has its share in the matter, and cannot escape the task of determining the natural history of each newly discovered parasite, as well as of those already well known.

When we add, that the question of the physiological peculiarities of the structures under discussion has also to be determined, involving the explanation of their morbid influence, and that this is expected from chemistry, these few remarks will serve to indicate

the extent and difficulty of the task which has developed for special pathology.

If, from our standpoint, the difficulties seem almost insurmountable, even quantitatively, we must wholly renounce, for the present, any attempt at complete explanation of the phenomena, when we bear in mind, that, at present, no sufficient answers are forthcoming to the questions suggested by botany and chemistry; that the special pathology of these organisms is, for the most part, unknown, undemonstrated, hypothetical, or, at least, unexplained.

This would not be admitted by all. There are some scientific writers who think they have solved these various questions. The value of their opinions, however, is considerably lessened by the fact, that a great number of naturalists deny the justice of their conclusions, and hold that it is better, for the present, to confess our ignorance on the subject, and, indeed, speak categorically in opposition, as De Bary, for instance, who, a few years ago, wrote, "of fungi growing in the living body, and having particular diseases and modes of death of the animals associated with their development, we are acquainted with numerous forms and species, but know very little as to their life-history and development. More especially, are we quite at a loss as to how, whence, and under what conditions, they enter their host, questions which must be answered clearly and thoroughly before we shall be in a position to arrive at any conclusion as to the causal relationship between fungus and disease."[1]

Seeing, therefore, that, at present, we neither know the number and kinds of skin diseases set up by parasites, nor the number and kinds of parasitic organisms, nor their relationship to the vegetable organisms found elsewhere in nature, nor the method of their influence on the organs and tissues, nor are able to answer any of the questions which arise in connection with parasitic affections, and that only a few isolated facts can be communicated in regard to these various points, the only course open to us is to follow the historical course of the discoveries, and to deal with those results and opinions which appear to be most helpful towards arriving at the wished-for decision.

History.

As once before in the history of medicine (in regard to

[1] 'Botanische Zeitung, redig.' von Hugo von Mohl, und A. de Bary, Jahrg. 1867, Nr. 1.

scabies), a fruitful impulse was imparted to human pathology by veterinary medicine, so a second impulse was given, when Bassi and Balsamo, in the year 1835, discovered that the so-called "Muscardine" (a contagious disease affecting silkworms, and whose cause had been sought for most industriously since the time of Sauvages), was due to a fungus, named by Balsamo, *Botrytis paradoxa*, and subsequently, *Botrytis Bassiana* (Bals.).[1] If one kind of disease in animals could be set up and spread by fungus, other contagious diseases might depend on a similar cause.

In the first place, attention was directed to favus (Porrigo lupinosa), which had been recognised as contagious from an early period. Schönlein was the first to recognise the fungoid character of the elements constituting favus[2] (1839), which he at the same time described accurately and figured; Remak, in the year 1837, having noted the peculiarities of the same.[3] The discovery of the favus fungus, named by Remak in honour of Schönlein, *Achorion Schönleinii*, was quickly followed by similar discoveries in regard to a whole series of other diseases of the skin. Thus, Gruby (1843) and Malmsten discovered a fungus in the disease called by Cazenave herpes tonsurans (Porrigo scutulata, of Willan, Tinea tondens, of Mahon, Tinea tonsurans, Ringworm of English authors); Günsberg found a fungus, in 1843, in plica; Gruby, in sycosis, in 1842; Lebert (1845), in ulcers of the leg; Eichstedt (1846), in pityriasis versicolor; Gruby (1843), in tinea decalvans (Alopecia areata), &c., &c.

All these observers confined themselves to establishing the mere fact of the presence of a vegetable structure in the disease mentioned and to giving descriptions of the same. The question which immediately demanded an answer, how far these structures were to be regarded as essential, that is, as causes for the particular diseases, or merely as unessential and accidental occurrences, was decided in the former sense, having regard to the well-established precedent afforded by the fungus *Botrytis Bassiana* (Bals.) in muscardine, and to the fact that Remak, by direct experiment, had shown that

[1] Balsamo, 'Gazette de Milan,' 1835, cit. bei Robin, 'Histoire naturelle des Végétaux parasites qui croissent sur l'homme et sur les animaux vivants,' avec un atlas de 15 planches, Paris, 1853, p. 594.

[2] Schönlein, "Zur Pathogenie der Impetigines," 'Müller's Arch.,' 1839, p. 82, taf. iii, fig. 5.

[3] 'De Morbo Scrophuloso, Dissert. inaugur.,' Xaverus Hube, Berolini, 1837, p. 19.

favus could be communicated from one man to another by means of the fungus found in the favus crusts[1]—facts which completely overpowered the scornful doubts of a few clinical authorities (Cazenave) as to the existence and etiological importance of these vegetable organisms.

The natural history of these structures, though as important, doubtless, or even taking precedence, was not, properly speaking, dealt with; they were at once regarded as distinct species. As the individual forms of disease represented pathologically distinct kinds, the forms of fungus found in the different affections were regarded as pathologically belonging to them, and represented as being special forms of fungus. Thus, we had to consider as different species:—*Achorion Schönleinii* (Remak), s. *Oidium Schönleinii* (Lebert), s. *Mycoderme de la Teigne* (Gruby)—the fungus of favus; *Trichophyton tonsurans*, s. *Trichomyces tonsurans* (Malmsten)—the fungus of herpes (tinea) tonsurans; *Trichophyton sporuloides* (Ch. Robin[2])—the fungus met with in the adhesive masses of plica polonica; *Trichophyton ulcerum* (Ch. Robin[3])—the fungus of chronic ulcers of the leg, discovered by Lebert;[4] *Microsporon Audouini* (Gruby[5]), s. *Trichomyces decalvans* (Malmsten[6])—the fungus of porrigo decalvans; *Microsporon mentagraphytes* (Ch. Robin[7])—the fungus accredited by Gruby[8] to sycosis; *Microsporon furfur* (Ch. Robin[9])—the fungus discovered by Eichstedt[10] in pityriasis versicolor; and, lastly, in addition to the *Achorion* in favus, a second fungus discovered by Ardsten[11]—the *Puccinia favi*.

Such was the state of affairs till the commencement of the second half of the present century. The results of the numerous investi-

[1] 'Remak, Diagnostische und pathogenetische Untersuchungen in der Klinik des Geheimrathes Dr. Schönlein,' Berlin, 1845, p. 208 *et sequ.*

[2] Robin, l. c., p. 424.

[3] Robin, l. c., p. 425.

[4] Lebert, 'Physiologie pathologique.' Paris, 1845, t. ii, p. 484 et Atlas pl. xxii, fig. 7.

[5] Gruby, 'Comptes rendus des Séances de l'Acad. des Sciences de Paris,' 1843, t. xvii, p. 301.

[6] Malmsten, 'Müller's Archiv,' 1848, p. 7.

[7] L. c., p. 430.

[8] Gruby, 'Comptes rendus,' &c., 1842, t. xv, p. 512.

[9] Robin, l. c., p. 436.

[10] Eichstedt, 'Neue Notizen der Naturkunde von Froriep,' 1846.

[11] "D'une nouvelle espèce de végétal dans le Favus," 'Gaz. des Hôpitaux,' Paris, 1851, p. 477, 478. (Robin, l. c., p. 613.)

gations made were restricted to ascertaining merely the presence of fungi, their extension in the epidermis and the hair, and the comparison of these results with one another; some statements as to the occurrence of fungi were shown to be erroneous, as we shall explain fully in treating of the special affections. For the sake of clearness, however, I will now state that, of the fungi named, those said to exist in alopecia areata, in ulcers of the leg, and in plica (which latter, in fact, is not a disease at all), have not been verified by subsequent observations; that the presence of a fungus in sycosis can only be said to be proved in a very limited sense; and, lastly, that the *Puccinia favi* is merely an accidental admixture with the favus fungus.

That the elements under discussion were to be regarded as fungi could not be doubted for a moment. They were characterised, like them, by the absence of chlorophyll, and consisted of cell elements, isolated or arranged in simple or branched chains, and simple and branched thread-like structures, such as are met with in fungi, already well recognised, growing independently in nature, and unconnected with the human organism.

Although the latter have many very essential morphological characteristics which are not met with in the parasitic structures above mentioned, yet the classification of these did not cause botanists any difficulty. In Robin's work, published in 1823, and still valuable for its descriptions, they are designated as above stated, grouped in distinct species according to their pathological situation, and regarded as fungi; whilst the vegetable structures previously found on mucous membranes, in the form of single or multiple cell structures (*Psorospermiæ, Sarcina*), or single thread-like ones (*Leptothrix buccalis*) are referred to the Algæ.

Pathologists have, as may be easily understood, followed the botanists in botanical matters, as the latter have simply registered the pathological statements of physicians.

In support of the first statement, may be adduced the widely-circulated and oft-quoted treatise of Küchenmeister,[1] which in the botanical part—apart from certain results of his own observations—is chiefly a translation of Robin's work.

This very limited outlook, resulting in distinctions between individual parasites being drawn, not from varied botanical characters,

[1] 'Die in und an dem Körper des lebenden Menschen vorkommenden Parasiten.' Leipzig, 1855.

but from difference of pathological situation, could not persist for long.

After Lowe, in the year 1850,[1] had shown that the fungus of herpes (tinea) tonsurans was only a spore-producing form of the favus fungus, and that both were derived from *Aspergillus*, an ordinary mould, Hebra next expressed his opinion (in a publication in the year 1854)[2] that there was an intimate relationship between the fungus of favus and that of tinea (herpes) tonsurans, on the one hand, and the ordinary mould fungi on the other. Hebra was led to form this opinion from the fact that after the persistent application of moist mouldy compresses he had frequently observed circles develop on the affected parts of skin, resembling those of tinea (herpes) tonsurans, and within these had seen favus crusts develop.

These opinions certainly did not amount to more than conjectures. But, even in this conjectural form, they could only be supported on the basis of the then generally received teaching as to fungi. We must now make ourselves acquainted with this.

In the first place, fungi were strictly separated from algæ, and held to be radically different.

Fungi are distinguished from algæ by the absence of chlorophyll. In consequence of this peculiarity, they are not able to produce constituents necessary to their vegetation out of inorganic material; that is, they are not able to assimilate the latter, but can only appropriate previously prepared organic substances. Hence they are dependent on other organic substances for life.

One group is most frequently met with on dead, decomposing organic substances; they are called Saprophyta.

A second group obtains its nourishment from living organisms, animals, or plants; they are Parasitæ.

Morphologically, fungi consist of cellular threads without chlorophyll, mycelial threads (hyphæ), which are single or branched, often much twisted or matted together, and make up the principal part of the so-called vegetative portion of the fungus, the thallus or mycelium.

In addition to this vegetative part of the fungus, there is, also, the fructifying part, which varies much in different kinds, and affords the most essential means of distinction between the various fungi.

Since, as we have already indicated, the parasites affecting the

[1] 'Botanical Transact.,' Edin., 1850.

[2] 'Med. Jahrb. der k. k. Ges. d. Ærzte,' 10 Jahrg., 1854, 2 B., p. 14, *et segu.*

human skin were associated with the ordinary mould fungi as early as the commencement of the second half of the century, and as, subsequently, they also became of importance, in another sense, in mycology, we will take as an example for the explanation of the morphological conditions, the common mould fungus—the *Penicillium crustaceum*, Fries (see Fig. 3).

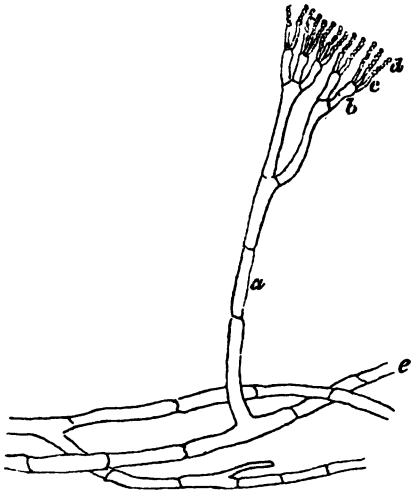


FIG. 3.—*Penicillium crustac.*, Fries; *a*, hypha branching off at right ai from the layer of mycelium (*e*); *b*, basidia; *c*, sterigmata; *d*, ma conidia, separating as if by strangulation (Abschnürung).

From the horizontal, many-branched layer of mycelium, a twig (*a*) passes off at right angles, the fruit-bearing hypha. It divides into two branches, and each of these into two basidia (*b*). From each of these arise three conical sterigmata (*c*), from which are detached as if by a process of strangulation (abschnüren sich) roundish cells (*d*) called spores, arranged like pearls on a necklace.

These structures—basidia, sterigmata, and chains of spores—are spoken of, now-a-days, as the organ of fructification; the individual spores are to some extent fruit or seed. For the individual spores separate, and develop, in a proper soil, into a mycelial network, from which brush-like structures may again develop. As the whole greatly resembles a camel's-hair pencil, the fungus fructifying in this way has received the name of *Penicillium glaucum* Link (*Penicillium crustac.* Fries).

We are also aware, however, that the method of fructification described is not the only one by which fungi grow, thrive, multiply, and spread. We know that the mycelial threads of the thallus itself may possess solitary or multiple spherical buds, which may separate as round cells, and grow into threads, &c. This kind of propagation, by so-called conidia, is only temporary, however, determined by unfavorable conditions of nourishment, temperature, degree of moisture, the medium, &c. As soon as the conditions of growth become more favorable, the pencil-shaped organs of fructification are formed. These, alone, represent the typical conclusion of the vegetative process for this kind of fungus, and the characteristic criterion by which it may be demonstrated. The same applies to the other mould fungi, *Aspergillus*, *Mucor*, &c.

In regard to the systematic arrangement of the parasites of favus, tinea (herpes) tonsurans, &c., the misleading fact was met with that no proper fructification-formation was observed. Increase by budding, by the formation of spores (conidia) being alone witnessed.

Hebra's supposition, noted above, of the relationship existing between favus and tinea (herpes) tonsurans and the mould fungi pointed out a fresh direction in which the parasitic diseases of the skin might be studied. It was necessary, henceforth, to determine the essential character of the mould fungi occurring free in nature, and their direct influence on the human skin, and, *vice versâ*, the relation of the fungi met with in skin diseases to the well-known forms of mould fungi—in the first place, of course, to discover the existence of this supposed relationship.

It would be of no advantage to the proper understanding of this very complicated matter, if I were, here, to enter into details as to the studies and experiments undertaken with a view to the solution of this question, or if I were to adduce the various clinical facts which support, or contravene, the supposed identity of favus and herpes (tinea) tonsurans.

We are only concerned, in this place, with the estimation of the efforts made to determine the botanical relationships of the dermatophyta.

We shall find from what follows, however, that the question originally comprised within such narrow limits, has, owing to the advancement of scientific knowledge, so developed from the special to the general, that the former finds its answer solely in the latter.

On this account, it may, therefore, suffice to adduce, here, merely the principal results of investigations bearing on these questions.

As I shall mention the details in the special parts, I will, at the same time, give my readers an opportunity to form their own conclusions—whether they agree with my own or not.

At one time, it appeared as if the efforts made would be crowned with success. In addition to many negative results (Köbner)[1] there were some positive ones obtained, according to which it appeared that by inoculating mould fungus (*Penicillium*) in the skin, rings resembling those of tinea (herpes) tonsurans could be produced (Pick);[2] favus fungus also produced tinea (herpes) tonsurans (Pick, Köbner, l. c., Peyritsch);[3] the fungus of tinea (herpes) tonsurans produced "microscopic crusts (scutula)" (Pick); and it was even asserted that ordinary mould fungus had been developed out of favus fungus.

Clinical observation and the results of experiment apparently agreed, therefore, in supporting Hebra's suggestion, subsequently laid down as an axiom by Lowe,[4] and it seemed highly probable that the parasites met with in favus and tinea (herpes) tonsurans were essentially identical, and merely represented different forms of growth or development; the diseases favus and tinea (herpes) tonsurans being, also, but one malady, appearing, according to its stage of development, at one time, in the form of favus, and, at another, as tinea (herpes) tonsurans, or as a combination of the two; and, lastly, that the fungus met with in this cutaneous malady was the offspring of a common mould fungus, probably *Penicillium* or *Aspergillus*.

But, closer examination of the results mentioned, and the means and manner of their acquisition, showed, that they could not by any means be regarded as conclusive.

These rings were not unhesitatingly identified by all as tinea (herpes) tonsurans, but were regarded quite variously. The "microscopic scutula" obtained after inoculation from tinea (herpes)

[1] Köbner, 'klinische und experimentelle Mittheilungen aus der Dermatologie und Syphilodologie.' Erlangen, 1864.

[2] Pick, 'Untersuchungen über die pflanzlichen Hautparasiten, in den Schriften der k. k. bot. Gesellschaft.' Wien, 1865.

[3] Peyritsch, "Beitrag zur Kenntniss des Favus," 'Wiener med. Jahrb.,' 1869, 2, H.

[4] "On the Identity of Achorion Schönleinii and other Vegetable Parasites with Aspergillus glaucus," 'Annals and Magazine of Natural History,' 2nd series, xx (1857), p. 152.

tonsurans (Pick) could no more be regarded as favus, than the crusts, indistinguishable from those of favus, which Zürn[1] obtained from the inoculation of *Penicillium* on a rabbit.

As regards the asserted direct demonstration of the genetic connection between favus fungus and mould fungus, it was very awkward that one observer (Pick) by cultivation of the favus fungus should obtain *Penicillium* (incidentally *Aspergillus*); another (Lowe), only *Aspergillus;* a third (Hoffmann), *Mucor*,[2] also *Penicillium* and *Aspergillus;* a fourth (Neumann),[3] ten different sorts of fungus; leading authors to explain each other's results by "contamination of the material." As the fructification-forms mentioned were regarded as belonging to essentially different species of fungus, the thought suggested by the isolated results of these inoculation experiments and the differences between them gained confirmation—one must at once admit the possibility that the discovery of *Penicillium,* or *Aspergillus,* or *Mucor,* &c., during the cultivation of favus, depended on the previous admixture of these same fungi.

The search after the "organs of fructification" of the fungus of favus, tinea (herpes) tonsurans, &c., could not, however, on this account be given up. It was of equal importance with attempts at the systematic arrangement of the fungi.

The undeniable failure of all attempts as yet made, even down to the latest date, to establish the identity of the fungus of favus and tinea (herpes) tonsurans with one another and the known mould fungi, either by experiment or by cultivation, has not by any means overthrown the fundamental principle of Hebra's suggestion. On the contrary, originally based on clinical observation, it has received fresh and notable support from facts which have also had a reforming tendency in botany. These had also served as a basis for the works mentioned, and still exercise their influence on the explanation given of parasitic morbid processes. I allude to the discovery of the so-called "polymorphism" ("pleomorphie") of fungi.

Until the commencement of the second half of the present century, "it was considered certain, that each species of fungus developed but one special form of organs of fructification, and, that each

[1] Hallier, in 'Virchow's Archiv,' 1868, xliii, p. 289.

[2] Hoffmann, 'Bot. Zeitung. Jahrg.,' 1867, Nr. 31, und in dess. 'Mycol. Ber.,' Giessen, 1872, p. 130.

[3] Neumann, "Zur Entwicklungsgeschichte des Achorion," 'Archiv für Dermat. u. Syph.,' 1871, H. 1, u. H. 2.

species of fungus could have but one form of spores, just as a flowering plant could have but one sort of seed."[1]

In 1851, Tulasne made public his discovery, that, not only might one fungus, now and then, have several forms of spores, but, also, that in one large family of fungi (Pyrenomycetes) several organs of fructification become developed constantly and in a special order of succession. He showed, in this way, that a series of divisions instituted on the ground of difference in form of spores are merely form-groups belonging to one species—form-genera, as de Bary puts it.

This polymorphism of the reproductive organs, demonstrated by Tulasne, was soon shown by himself and others (Kühn, de Bary, &c.) to exist in other instances, and the discovery was thus confirmed and its application extended. For instance, it appeared that there was a certain regular succession of this polymorphism of the reproductive organs for various fungi, in such a way, that one member of the series formed a necessary antecedent to its successor, and that the process of development always ended with a special form, whence began again the same series of developmental changes—in short, that there was a sort of alternation of generations.

As one of the best known examples of regularity of polymorphism, we will adduce that shown by de Bary to exist in *Puccinia graminis*. In the first place, spores form in the summer serving for the rapid increase of the plant. Towards autumn, from the same mycelium come winter spores (Teleutosporen). These cannot, however, develop further on Gramineæ, but only on the Berberis. Here, they form the fungus previously known as the *Æcidium Berberidis*. It is only the spores derived from this which will again develop on Gramineæ and form *Puccinia*.

By the demonstration of the occurrence of polymorphism in many fungi, the whole systematic arrangement of the latter was disturbed. One must be prepared any day to hear that any one of the fungi hitherto regarded as a well-established species has been shown to be merely a developmental intermediate stage of some higher fungus, and not an independent species. As soon as pathologists began to pay attention to the more intimate botanical processes, they became aware, from the circumstances mentioned,

[1] De Bary, "Morphologie und Physiologie der Pilze, Flechten und Myxomyceten," Leipzig, 1866 (im 'Handb. der physiolog. Botanik, herausgegeben,' von W. Hofmeister), 2 B., p. 173.

that the fungi met with in cutaneous affections might ultimately be shown to be transitional forms of some higher mould-fungus, and, the more so, because, clinically, favus and tinea (herpes) tonsurans had been seen to merge into one another, or, at least, to occur in combination under the same external conditions, and further, as has been previously mentioned, some had even supposed that they had been able to demonstrate the development of favus fungus into a fructifying fungus.

Botanists were unable to assign any limits to the discoveries which might accrue in regard to polymorphism. In the hands of certain investigators, its scope became almost unlimited.

In the first place, it resulted that a great number of exceedingly minute microscopic organisms became of importance in pathology, generally, and mycology in particular, which, previously, so far as they had been noticed at all, had been considered to have no connection with fungi.

First of all, amongst these, are exceedingly minute microscopic organisms, whose most important examples are represented in Fig. 4 (1 to 8), and which are described, separately, under the names of *Micrococcus, Bacterium termo, Monas crepusculum, Spirillus*, &c., and, collectively, are usually designated Schizomycetes (Nägeli),[1] because they multiply by fission ($\sigma\chi\acute{\iota}\zeta\omega$=to cleave).

Secondly, there are the peculiar cell-structures which constitute the yeast plant (Hefe), and which most botanists, up to the present time, consider to hold a completely isolated position in reference to other fungi, whilst some investigators believe they can define their nature and relation to fungi.

These exceedingly minute organisms became of great importance in reference to our special theme, because the history of their development shows them to be related, on the one hand, to the higher fungi, and, on the other hand, to the forms of fungi occurring in cutaneous maladies.

At the same time, the study of these structures and their importance has been rendered very difficult by the fact, that a host of real, or supposed facts show, that a great many, one might almost say nearly all, pathological and even physiological processes of the human organism, digestion for instance, have been brought into the group of parasitic diseases, as the expression of the function of the organisms named; in a similar sense, perhaps, to that in which

[1] Nägeli, 'Über Schizomyceten, Verhandlungen der Naturforscherversammlung zu Bonn,' 1875.

alcoholic fermentation is represented to be the effect of the fermentation fungus.

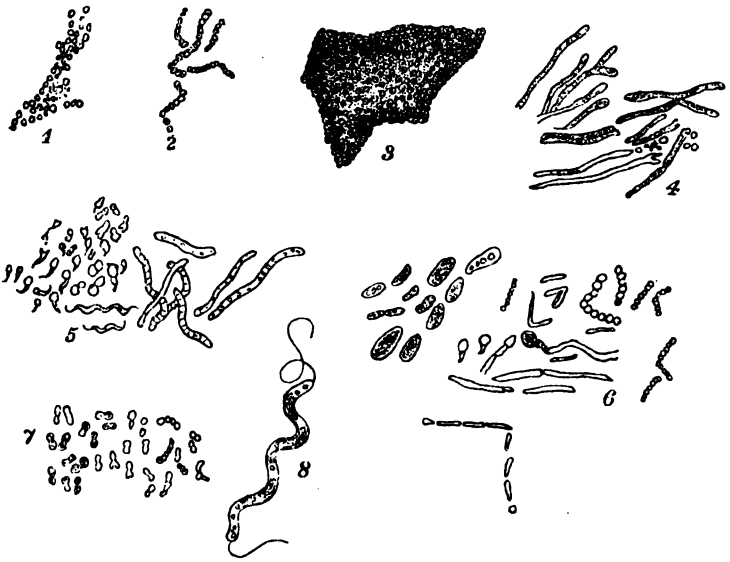


FIG. 4.—1, Micrococcus; 2, Mycothrix; 3, Zoogloea; 4, Leptothrix; 5, Vibrio; 6, Bacterium; 7, Bacteridia; 8, Spirillum (after Zürn, 'die Schmarotzer,' &c., 2 Th., Weimar, 1874, taf. 1).

In cholera, variola, vaccinia, erysipelas, scarlet fever, measles, typhus, diphtheria, nephritis, dysentery, hydrophobia, embolism, pyæmia, malignant pustule, and many other processes, exceedingly minute organisms of the sort described have been demonstrated, and are now recognised as the contagium, or contagion-carrier, for each particular affection, this being looked on, eo ipso, as contagious and parasitic in the widest sense, though, clinically, it may not by any means present features supporting such a supposition.

The questions with regard to the signification of these bodies, their place in natural history, and their influence on the human animal organism, have occupied scientific investigators for the last fifteen years, and their solution concerns botanists and chemists almost as much as pathologists. They have been answered either wholly or in part, multifariously, and in the most contradictory manner.

The most formal solution of the question is undoubtedly that given by Hallier.[1] His views, which he has stated with almost dog-

[1] Hallier, 'Die pflanzlichen Parasiten,' Leipzig, 1866; 'Gährungser-

matic certainty, have been accepted for some years by a large section of clinical observers and medical men.

Although, in a strictly scientific sense, we cannot attribute any value to them, still, we must adduce their fundamental principles here, because many pathologists have accepted them and, in part, do so still.[1]

By his studies on the history of their development, Hallier has demonstrated that the organisms present in morbid processes and known by the terms, *Monas crepusculum, Bacterium termo, Vibrio, Bacterium, Bacteridium, Spirillum, Torula, Leptothrix, Microzymes*, &c., the various yeast forms (Hefe-formen), such as *Oidium, Saccharomyces, Hormiscium*, and, finally, the well-known forms of mould, the common *Penicillium, Aspergillus*, &c., do not represent any special kinds of plants, but only morphoses, vegetation-forms, of one particular fungus, so that out of the lowest forms the fructifying parent-form may be developed.

According to Hallier, under special conditions the fungi develop thoroughly special vegetation-forms, morphoses, according as to whether they grow freely exposed to the air—aërophytes; or are partly immersed in fluid and less exposed to the air—hemianaërophytes; or are wholly submerged—anaërophytes.

If we immerse a cell, a spore, a conidium of a fungus, of *Penicillium*, for instance, in some fluid which will not destroy its vitality, so that it is shut off from the air, and, therefore, becomes an anaërophyte, it will not continue to grow in the way in which it does when growing free in the air, but the cell swells up, its protoplasm, its nucleus, divides repeatedly, and a number of small, round corpuscles are produced. The spore at last bursts and the granular contents escape. These granules Hallier calls *Micrococcus* (Kernhefezellen).

These micrococcus cells are in constant motion for a time, then become quiescent, grow and multiply by repeated division—Schizomycetes; become arranged in biscuit-shaped or chain-like groups—*Leptothrix*; or enveloped in a glue-like mass (Glia-masse), secreted

scheinungen,' Leipzig, 1867; 'Parasitologische Untersuchungen,' Leipzig, 1868; und 'Zeitschrift für Parasitenkunde dess. Autors,' Jena, 1869—1873 und 1875.

[1] A detailed account of them will be found in my article, "Ueber den gegenwärtigen Stand der Lehre von der ätiologischen Beziehung kleinster Organismen (Micrococcus) zu den Infectionskrankheiten," Wien, Braumüller, 1874. ('Sep.-Abdruck aus der Vierteljahrschrift für Dermatologie u. Syphilis,' 1874, 1.)

by themselves—*Zooglœa*, Cohn; or, the individual micrococci grow into rod-like structures—*Bacterium*.

These forms, when in a fermentable fluid, may become true yeast, bottom yeast (Unterhefe), that is, a unicellular fungus morphosis, either *Micrococcus* (Kernhefe), or *Cryptococcus* (Sprosshefe), or *Arthrococcus* (Gliederhefe).

If the latter are carried to the surface (as by the gas developed during rapid fermentation), so that they are partly exposed to the air (top-yeast, Oberhefe)—hemianaërophytes, they resemble oidium forms, *Torula*, *Hormiscium*, dendritic arrangement of cells, and are called jointed mould (Gliederschimmel).

Each of the varieties of the yeast plant (Hefe-arten) mentioned, like the micrococcus, if on a dry soil and exposed to the air, passes into a true aërophytic form of fungus—the parent form.

This *Micrococcus* and its anaërophytic forms, *Leptothrix*, *Bacterium*, *Spirillum*, &c., give rise to all the miasmatic, contagious and infectious diseases, by setting up fermentation, disintegration, and disease in the tissues and fluids of the human organism, in the same way that yeast-cells (Hefezellen) act on organic substrata of another sort.

These circumstances also explain, according to Hallier, why it is that within the body, in the blood, in the parenchyma (asserted as regards many diseases), &c., we only meet with *Micrococcus* and allied yeast-forms (deren Hefe), for, here, we can only get the anaërophytic forms of any fungus; and why, in the human epidermis, in favus, herpes (tinea) tonsurans, pityriasis versicolor, &c., oidium-forms only occur, because, here, only the hemianaërophytic forms can become developed.

From these facts, and because he believes that it is possible to tell from what mould fungus any particular micrococcus has descended, and, especially, because he has been able to grow the parent form from the micrococcus, Hallier considered he had ascertained for each of a large number of contagious forms of disease, or such as will eventually be regarded as contagious, the special fungus whose micrococcus, in its yeast-form (Micrococcus-Hefen) excites the disease.

Thus, he asserts that favus is due to *Penicillium*, tinea (herpes) tonsurans to *Ustilago carbo* (which, according to Hallier, is a form of *Aspergillus*), pityriasis versicolor also to *Aspergillus* (Achorion series), varicella to *Pleospora herbarum*, variola to *Sporidesmium-Stemphylium*, and so for typhus, cholera, syphilis, gonorrhœa, &c., each

being due to a fungus, either previously known, or pointed out for the first time by himself.

These statements of Hallier had a very tempting appearance to most physicians, and made, as a rule, a great impression. For, with each disease was associated, with every certainty, and in a thoroughly systematised form, the respective fungus as a comprehensible cause of disease.

The immediate result of Hallier's teaching was that a large number of medical men undertook investigations in the direction pointed out by himself. Some of these, however, were so frivolous in method, and resulted in such monstrosities, that these works, appearing in great part under Hallier's Ægis, excited the greatest mistrust of his own results.

For there was no single disease—whether warts, eczema, psoriasis, prurigo, pruritus cutaneus, or inflammation, erysipelas, &c.—which could not be attributed to a fungus.

I have in another place[1] adduced the important considerations which militate both against the method pursued by Hallier, and, indeed, his whole manner of representation. We can only note here, shortly, that even Hallier's own treatise did not fulfil the expectations of medical men; that, especially, in his account, it does not happen that forms of disease which are markedly distinct, clinically, have associated with them fungi which are, also, botanically, markedly distinct from one another; one disease, for instance, being associated with *Penicillium;* another, with *Aspergillus;* a third, with *Ustilago carbo*. Hallier, on the contrary, says that the human parasitic fungi may all be referred to four sorts of mould-fungi; of these, two (*Diplosporium fuscum* and *Stemphylium polymorphum*) have been described by Hallier for the first time as quite new ones,[2] but are not recognised by botanists; the two others, *Penicillium* and *Aspergillus*, according to him[3]—though not according to most botanists—are occasionally transmutable. There remains, therefore, merely, the quite common, but, botanically, not clearly definable mould-fungus, whose morphoses excite all, and the most heterogeneous, contagious and infectious diseases.

This mould-fungus has not, by any means, any very well-defined specific individuality, for Hallier, elsewhere, regards *Penicillium*

[1] In my treatise, above quoted, on Micrococcus.

[2] Hallier, 'Die pflanzl. Parasiten,' &c., p. 82 und p. 86.

[3] Hallier, 'Die pflanzl. Parasiten,' &c., p. 75.

(and also *Aspergillus*) as a morphosis in a large developmental series, which, for *Penicillium*, for instance, includes *Penicillium* (Acrosporiumform), *Mucor racemosus*, Fres. (Thecasporiumform), *Tilletia caries* (anaërophytic generation), *Achlya* (sexual generation), to which must also be added, as No. 5, *Cladosporium* (Arthrosporium- and Schizosporangium- form).[1]

In reference to the question whether, mycologically, the fungus of favus is identical with that of tinea (herpes) tonsurans, as the two diseases clinically show close relationships—a question of great importance, not only in dermatology, but also in regard to the whole subject, certainly the mycoses—Hallier's results are remarkable, but in an unexpected manner. For though Hallier, in the year 1866,[2] stated that favus and tinea (herpes) tonsurans depended on one and the same fungus—*Penicillium;* the former, on its achorion-morphosis (Achorion-morphe); the latter, on its acrosporium-yeast (Acrosporenhefe), a year subsequently (1867[3]), he derives the fungus of tinea (herpes) tonsurans from *Aspergillus*, from which also the fungus of pityriasis versicolor descends, the microsporon being the yeast-form (Hefe) of the oidium-spores (Ustilago-spores) and the trichophyton, the oidium itself of the series of morphoses—*Aspergillus*, of the (two) former, *Eurotium*, *Ustilago*.[4]

Now, clinical observers expect that favus and tinea (herpes) tonsurans will prove to depend on the same fungus. It is also quite comprehensible that pityriasis versicolor may be a variety of the former. But, that favus should have nothing in common with tinea (herpes) tonsurans, whilst the latter has a common source with pityriasis vesicolor, as Hallier considers he has shown on botanical grounds,—against such an hypothesis clinical experience wholly militates.

If, even from a medical point of view, Hallier's doctrine seems to have a very precarious scientific value, medical men will be still more careful of embracing it when they consider that botanists and mycologists most distinguished for method and knowledge, such as de Bary, Hoffman, Bonorden, and even some who on certain points—the derivation of yeast-forms (Hefe) from fungi, for instance, agree with Hallier (Bail, Hoffmann, Berkeley)[5]—all criticise, most damagingly, Hallier's methods and results, and deny that his

[1] 'Parasital. Untersuchungen,' p. 19.
[2] 'Die pflanzl. Parasiten,' p. 72.
[3] 'Gärungserscheinungen,' p. 79.
[4] Ibid., p. 82.
[5] In reference to this, however, de Bary says that from the higher fungi,

doctrine has any foundation in fact, or any scientific value. One cannot possibly be unmindful that such a botanist as de Bary was never able to develop yeast forms, capable of exciting fermentation, from mould-fungi; that such a mycologist as Hoffmann never succeeded in finding in scarlet fever, diphtheria, vaccinia, &c. any organisms which were wholly free "from the suspicion of having been added from without;" that none of these experimenters have seen micrococci escaping from fungus spores, much less have they been able to develop the higher fungi from them, whilst pupils of Hallier boast of the unexampled scientific feat of demonstrating such within a few hours—and even macroscopically!

It is not our object, nor is this the place to go into detail as to the failings and notorious defects of Hallier's doctrine. What has been said may be sufficient to justify the doubt which pathologists must feel, for the present, regarding it.

On our part, however, we do not wish to deny the possibility that a part of his work, and possibly just that which is specially interesting, may, in some form or other, eventually be shown to be correct. For clinical experience undoubtedly shows that tinea tonsurans rings, and favus are produced by the probable influence of mould-fungi; and that both these may exist in combination. The explanation of this fact is not as yet forthcoming.

Moreover, as we shall presently see, the latest botanical discoveries show, in some measure at least, a transmutation of algæ into fungi.

However unanimous and direct may be the opposition of most botanists to Hallier's views as to the relation of the schizomycetes to the well-known cutaneous parasites and to the mould-fungi, the explanations of other investigators in regard to the structures named are no less open to criticism.

Most pathologists and botanists since 1860 separate the schizomycetes from the fungi very decidedly, and distinctly deny that the lower organisms can be derived from the latter.

As especially influential in this opposition we must adduce Ferdinand Cohn. His works on Bacteria, beginning with a publication in the year 1853[1] and arriving at a sort of conclusion in

only yeast-like ("hefeähnliche") spores, which are not capable of exciting fermentation, can be derived. Such, for instance, was the case as regards a widely-distributed mould-fungus, to which he gives the name "*Dematium pullulans*" (de Bary, l. c., p. 182).

[1] 'Ueber die Entwicklungsgeschichte mikroskopischer Algen und Pilze, Nova Acta Acad. Carol. Leop., nat. cur.,' xx, v, 1, 1853.

fresh investigations on the subject in 1872 and 1875,[1] command great and merited attention in the scientific world as the results of exact investigation.

While fully recognising Hallier's merit as the "first to raise the question as to the relation of the ferments and contagia to the bacteria," and in leading a series of investigators to devote attention to the subject, Ferdinand Cohn yet declares that "the results of observations collected by Hallier himself, owing to recognised faults in his method, are rendered useless," and that "in Hallier's teaching in regard to *Micrococcus*, as Hoffmann and de Bary have already demonstrated, unjustifiable assertions and uncritical hypotheses are so interwoven that it is impossible to eliminate what is genuine observation."

According to Ferd. Cohn, bacteria are globular, oblong, or cylindrical cells, sometimes contorted or curved in shape, wanting in chlorophyll, reproduced exclusively by division, and growing either isolated or in families.

He thinks they form a family for which he proposes the name Schizophytæ. They certainly are not in any way genetically connected with yeast fungi (Hefepilzen) or mould-fungi (Schimmelpilzen). By exact microscopic examination, as well as by "decided results" of experiments, it is made certain that bacteria never develop into mycelial fungi (Mycelpilzen). Lastly, in spite of all the difficulties in the way, he has arrived at the conclusion that bacteria, various as they are in form, may be subdivided just as other lower plants and animals. He, therefore, arranges them in four tribes (Sphærobacteria, Microbacteria, Desmobacteria, and Spirobacteria). The forms grouped under these four tribes are pointed out and described as markedly distinct sorts and species.

Amongst them are of importance, as regards pathological processes, the *Zymogenæ*, that is, those which excite fermentation, and the *Pathogenæ*, that is, the globular bacteria met with in various diseases. Both kinds are considered, undoubtedly, to be causes of the processes named, the former exciting fermentation and the latter forming the contagia of the morbid processes.

An unprejudiced consideration of the matter will show, however, that this distinction does not rest on vegetative or morphological

[1] "Untersuchungen über Bacterien," in dess. Autors; 'Beiträge zur Biologie der Pflanzen,' Breslau, 1872, 2 H., p. 127, und ibid., 1875, 3 H., p. 141.

differential peculiarities of the organisms, but on their supposed difference in, so to speak, "physiological function." Because one is met with in diphtheria, and another in variola, the former is the contagium of diphtheria, and the latter of variola, &c.; and whilst both are regarded as contagia, they differ from one another, because diphtheria and variola, &c., are different processes.

That Ferd. Cohn has been chiefly led by the variety of the places where these structures have been discovered pathologically, to make corresponding special varieties of them, he admits pretty clearly. For, he says, "the bacteria found in the different contagia completely agree in form, in some instances, with those of urinary or butyric acid fermentation, in others, with those in pigment (that is pigment-bacteria);" and, further, he states that it is not as yet possible to decide with certainty, whether one and the same bacterium germ, in different substrata, at one time alkaline, at another acid, may not excite either alcoholic, or putrefactive fermentation, malignant pustule, or diphtheria; though he himself, at present, does not regard this as 'probable.'"

If we also bear in mind that the relation of the yeast fungus (Hefe) to fermentation and putrefaction, in general, is not by any means satisfactorily made out as yet; that, according to numerous recent investigations, proliferation of the yeast cells (Hefezellen) and of the schizomycetes may probably occur independently of putrefaction and fermentation; that the processes occurring in zymotic diseases are probably analogous, but certainly not identical with putrefaction and fermentation; and, lastly, that the discovery of microscopic organisms in zymotic diseases (if not actually erroneous, or probably so),[1] is still far from showing that these organisms are really the contagium—if we bear in mind all these facts, we shall be obliged to say, as regards Ferd. Cohn's doctrine of specificity, that, in the first place, the share exercised by the schizomycetes in the contagious diseases is not as yet made out, and, in the second place, just as little is known as to whether these structures are genetically connected with the higher fungi, or represent only one sort or several distinct sorts of plants.

The uncertainty of this relationship becomes more marked if we

[1] Very renowned botanists do not hesitate to express their doubts as to whether pathologists have not made various mistakes in this matter, have not, in fact, repeatedly taken "products of disintegration of organised bodies and even crystalline deposits of an inorganic nature," for bacteria (Sachs, 'Lehrb., der Botanik,' Leipzig, 1874, p. 253, Anm. 3).

keep in view the fact that a large number of investigators consider that all these structures are distinct from the higher fungi, but admit that they may undergo mutual transmutation (Klebs, Billroth); others partition off a part as very minute animals (Rindfleisch); whilst others regard them as animal cells derived from the tissue of the human body itself (Karsten, for instance).

We have, therefore, so far, arrived at a twofold result. According to Hallier, the fungi of the parasitic dermatoses are derived from the mould-fungi, and are connected with the yeast-fungus (Hefe) and the schizomycetes. This view, however, is considered by botanists of greatest repute as exact investigators to be wholly untenable, and irreconcilable in its present form with the demands of pathology. According to Ferd. Cohn, and a group of other investigators, the schizomycetes are, in part, exciters of disease, but are neither connected with the yeast-fungus (Hefe), nor with the mould-fungi, and, therefore, not with the dermatophytæ already known, and each disease has its corresponding microphyte. But, quite apart from the correctness of individual facts, the gaps and hypothetical suppositions are still so many, that even Ferd. Cohn's account has not succeeded in solving the questions connected with these parasites, either from a botanical or pathological standpoint.

Of late, another remarkable advance appears to have been made in mycology, in a direction scarcely anticipated and the result of which cannot be foreseen—a change of front which Sachs has been the first to adopt completely in his Treatise on Botany. And I do not know how far Hallier's supposition of the existence of a widely-prevalent polymorphism of fungi may not, in a certain sense, and more exact form, have received fresh support.

As is known, the thallophyten increase by brood cells or gonidia. These are developed from the mycelial threads by simple constriction, or from special structures bearing them springing from the hypha (basidia, sterigmata, as in *Penicillium*).

In addition, however, most of the thallophytes have a sexual reproduction, in contrast to which the former must be called asexual.

The fundamental process in sexual reproduction consists in the fact that two essentially different cells, the one, female (oogonium, oosphere, carpogonium), and the other, male (antheridium, pollinodium), unite together, and develop into a fruit organ, just as in

phanerogamous plants. From this come the true spores—fruit-cells.

The reproductive cells of the first kind, arising without difference of sex preceding, are, therefore, not spores, but gonidia.

On this matter, Sachs has the following:—"In many cases, and especially in many fungi, reproduction takes place almost exclusively by brood cells (gonidia), whilst it is only under very exceptionally favorable circumstances, that the normal termination of the developmental process by sexual organs and the actual formation of fruit is obtained; and it therefore happens that the sexual organs of many thallophytes are not as yet recognised, whilst their brood cells are met with everywhere. It is, at present, therefore, a mistake to assert, as regards any thallophyte, that it never forms sexual organs, for, even in the commonest mould-fungi, and many algæ, whose brood cells have long been known, it is only quite lately that the sexual organs and the resulting alternation of generation have been discovered."

This latter remark applies especially to the common mould fungus, *Penicillium*. This is the fungus, as we have already mentioned, which in various quarters has been considered to be genetically related to the fungi met with in favus, tinea (herpes) tonsurans, &c.; at one time, on the basis of clinical observation; at another, on the results of cultivation; it is, therefore, especially important for us to know that the brush-like form of *Penicillium*, which has hitherto been regarded as the characteristic fruit organ of this fungus, is not absolutely so.

Brefeld has shown that this brush form is only the first stage of development in the life of this fungus. From the mycelium, spring special, upright hyphæ, from which bud out basidia and sterigmata on which are conidia in rows, like a necklace (camel's-hair pencil). If, however, the luxuriant development of these brood cells is hindered by preventing contact with the air, sexual organs develop on the luxuriantly vegetating mycelium. These agree, essentially, with those described by de Bary in *Eurotium*, and consist of a female spiral ascogon, and a male pollinodium. From the fertilised ascogon arises a peculiar body—a small truffle. This sexual reproduction is, therefore, the typical final development of the common mould-fungus.

When, therefore, under certain conditions, by cultivation, for instance, structures with brush-like conidia are seen, these may either

indicate a mixture with *Penicillium*, or, if really produced from the object under cultivation, may still be derived from some other fungus than *Penicillium*. For it is known that various fungi, under particular circumstances, may develop penicillar conidia, which are not at all characteristic of its species, no more so, in fact, than the simple moniliform generation of conidia, directly from the mycelium is characteristic of any particular species. The sexual fructification alone can determine the species.

According to the account given by Sachs, we can, at present, only distinguish two sorts of thallophytes, the algæ and the fungi. Hitherto, all chlorophyllous thallophytes have been spoken of as algæ, and those without chlorophyll as fungi.

This distinction cannot,now-a-days, be maintained, for morphology and the study of the history of their development show that the fungi are derived from various algal types.

The important questions, now-a-days, therefore, are as to whether sexual organs are generally developed, and "the relation of the sexual act to the whole process of development." And the formations connected with the difference of sex become now the guides for the classification of the thallophytes. For it certainly becomes more and more probable that a fungus propagating by gonidia is only in an intermediate stage of its development, whilst the typical termination of the latter is a sexual fructification.

It follows, therefore, from the latest results of investigation (and in contrast to the earlier, faulty modes of representation), that we must remain in doubt as to the more exact systematic arrangement of the fungi giving rise to skin diseases, as long as we have no certain knowledge of their development and, especially, of their fructification, that is, really, of their organs of sexual reproduction.

At present, the only correct course is to confine ourselves to the bare facts, as de Bary did in 1866, when he expressed himself as follows, in words which are still valid:

"One question which must here be dealt with is as to whether the fungi named (those of favus, tinea tonsurans, &c.) are, really, special parasitic forms or not. The only organs belonging to them with which we are as yet acquainted are mycelial threads, from whose branches develop rows or chains of spores capable of germinating, somewhat like the twigs of the mycelium of *Mucor mucedo*, from which develop the brood cells strung in rows. Properly speaking, the fructification organs characteristic of the species are quite unknown."

"From the frequency with which the diseases in question and their associated parasites are met with, it is very probable that we must look elsewhere for the complete fructification of the latter, and most probably among well-known forms of fungus."

"If we cultivate parasites removed from the animal body, in water, solution of sugar, &c., the germination of their spores can be observed, and, in a short time, mould-fungi, such as *Penicillium glaucum*, *Aspergillus glaucus*, or yeast-cells (Hefezellen), will develop in all parts. The latter and the mycelium of the *Penicillium* resemble more or less the spores and the mycelium of the parasites in question; they are immediately in contact with the latter, so that it seems as if they had developed from them after change of medium.

"Hence the view (advocated chiefly in England, and more especially by Tilbury Fox) that achorion, trichophyton, &c., are merely brood-cell-forming mycelia of ordinary mould- and fermentation fungi (chiefly *Penicillium* and *Hormiscium cerevisiæ*) developed on animal bodies in some way particularly predisposed to their formation. According to the special predisposition of the habitat, the same mould-fungus may develop either into an achorion or trichophyton, &c."

"If we bear in mind how exceedingly frequently *Penicillium* and *Hormiscium cerevisiæ* crop up in the most varied and most carefully conducted cultivation of fungi, and, indeed, can be seen to develop from their widely diffused germs; if, also, we keep in view the fact that it is impossible to exclude these germs from the objects under cultivation, and that even skilled mycologists may easily confound penicillium-mycelium with that of other fungi, and yeast-cells (Hefezellen) with spores, the view above mentioned, in the form in which it has as yet been stated by professed non-mycologists, must be in the highest degree doubtful."

"That *Aspergillus*, *Penicillium glaucum*, and *Hormiscium cerevisiæ* themselves are certainly not true reproductive forms of species of fungi may be left out of consideration. In any case, the above view must remain unproven, and the fungi in question be considered truly specific parasites, so long as it has not been shown experimentally, that by inoculating *Penicillium*, *Torula*, &c., on suitable skin surfaces, unmistakable favus, tinea tonsurans, &c., with characteristic fungus, can be produced, or that by inoculating one of the latter, some other cutaneous fungus can be developed."

From the foregoing sketch, roughly drawn, but, I hope, showing the essential features of the position of mycology at the present time, it will be seen that, in spite of the numerous observations on record of attempts at cultivation, we are far from being able to determine the proper relationship of the fungi met with in well established parasitic dermatoses to one another, or to the mould fungi, or, lastly, the position they should hold among the numerous members of the class of thallophytes.

If, therefore, some pathologists hold the opinion expressed by Hebra of the identity of favus and tinea tonsurans to be true, and even include pityriasis versicolor also, it is important that it should be understood that they are not at all supported by scientific mycology at the present time.

As, moreover, the partial congruence of the clinical symptoms, alone, does not suffice, as a matter of objective clinical observation, to identify the processes named with one another, because, as we shall point out in more detail in the special part of this treatise, on the contrary, there are very considerable clinical differences to be observed between these processes, and, as a matter of fact, they are considered distinct by all pathologists, it follows necessarily, from the above considerations, that we must, for the present, regard the fungi met with in the dermatomycoses as specific individuals, that they strictly belong to individual forms of skin disease, and we must do this so long as their relationship with other forms is not demonstrated.

And, lastly, it results that we shall proceed most in accordance with the pathology of the present day, if we consider and treat the fungi, not as a mere addition, nor merely, even, as the cause of the favus or of the tinea tonsurans, but, at the same time, and in the form in which they occur on the skin, as an essential symptom of the particular skin disease, and belonging to its character, as necessarily as the cutaneous redness, the scaliness, &c., and constituting the process in its entirety in association with the changes in the nutrition of the skin with which they are inseparably united.

It will be in this sense that I shall treat of the particular dermatomycoses in the following pages.

DISEASES OF THE SKIN CAUSED BY VEGETABLE PARASITES—DERMATOMYCOSES.[1]

General Symptomatology of the Dermatomycoses.

The skin diseases caused by vegetable parasites—dermatomycoses—are characterised by well-marked clinical macroscopic signs. These consist, partly, in spite of the microscopic size of their individual elements, of fungus structures perceptible to the naked eye, owing to their volume, as in favus; partly, where the fungus is not present in such quantity as to be visible to the naked eye, of those changes in nutrition and their consequences, which are set up in the affected cutaneous structures by the presence and the vegetation of the parasitic plants.

These pathological changes take the form, as a rule, of circumscribed, grouped, irregular, discoid or circular patches of disturbance and desquamation or discoloration of the epidermis, or of equally sharply defined inflammatory and exudative phenomena, in the form of circumscribed, macular, or annular congestion or collection of vesicles or even pustules. As more advanced consequences of such processes, we meet with degeneration and loss of the hair and nails, atrophy of the affected follicles and of the cutis, resulting in cicatricial atrophy.

The only complications are such as might occur with any local inflammation and exudation; inflammation and suppuration of lymphatic glands and subcutaneous tissue, and, rarely, periostitis and necrosis of bone.

What has been said in former years, as to the driving in of parasitic skin diseases to the internal organs, or the statement which even Bazin[2] treats of gravely, that a fatal termination of a case of dermatomycosis (more particularly favus), has occurred, may be considered to belong, not simply to "History," as Bazin opines, but to "Fable." Such stories are either quite untrue or depend on erroneous estimation of the circumstances.

[1] We gladly accept Virchow's proposal ('Archiv,' 9 B., 1856, p. 558) for the designation of diseases caused by vegetable parasites—mycosis, with some special qualifying term added, as dermatomycosis, onychomycosis, &c.

[2] Bazin, 'Die parasitären Hautaffectionen. Deutsch von Kleinhans,' Erlangen, 1864, p. 30.

Anatomical Situation of the Vegetable Parasites and their Influence on the Skin.

The vegetable parasites in question are met with only in the epidermic structures of the human skin, that is, between the layers of the epidermis and of the hairs and nails, which are also epidermic structures. Accordingly, certain authors (Bazin) have divided the dermatophytæ into epidermophytæ, trichophytæ and onychophytæ. Such a subdivision is not justified on mycologico-botanical grounds, because different plants would not be in any way indicated thereby, nor would it have any value pathologically, for all the epidermic structures mentioned might be affected at the same time by one and the same process, and, indeed, by the same parasite.

That in undoubted dermatomycoses, that is, in those skin diseases whose parasitic character is recognised by all; even where the mycosis has existed for years, and even when severe inflammatory symptoms (with the formation of pustules and scars) exist, no one has ever seen or asserted[1] that the fungous elements have ever penetrated beyond the epidermic strata into the papillary layer, corium, lymphatics, or blood-vessels, is a fact of great and essential importance; it is a circumstance which cannot be insisted on too strongly in reference to mycotic embolisms and metastases which have been talked about so much of late years.

The sole effects produced by the parasitic fungi are local and mechanical. Their elements, especially the mycelium, separate the epidermic cells and layers in the same degree as they are luxuriant in their growth. As a consequence, some cells are prematurely separated from their nutrient substratum, the papillary layer, and thus their nutrition is interfered with in such a manner that before reaching their physiological term they become dry and brittle, and perhaps perish altogether. These elements certainly serve for the nourishment and propagation of the fungi, but we do not at present

[1] Such a penetration has, curiously, only been asserted in reference to cutaneous affections, where (for instance, by Weigert and Luginbühl in variola), as regards this assertion, everything has first of all to be proved; that the elements found in such processes are fungi; that the supposed fungus has penetrated into the cutis; and, lastly, that these elements are the cause of the particular diseases, and that the latter are parasitic.

know at all certainly what the material is which the parasitic fungi take up from the living tissues.[1]

Whether the elements of the fungus actually penetrate into the individual cells of the epidermis or not, I cannot say positively. Probably this is the case now and then, as may be seen at some parts of my illustration of favus (Fig. 6). As a rule, however, we only observe that the mycelium and spores penetrate between the epidermic cells. The same thing occurs in the case of the fungi growing on plants, for the former, also, usually select the spaces between the individual cells,[2] though under certain circumstances and in connection with particular parasites, the germ-tubes do also penetrate into the cells of the plants.

The changes caused directly by the growth of the fungus in the epidermic strata, the desquamation, discoloration, &c., are therefore strictly confined to the neighbourhood where the fungus is infiltrated, and, of necessity, appear circumscribed, well margined, and in larger or smaller groups.

During its further progress, however, the dermatophyte may set up symptoms of reaction in the subjacent cutis—hyperæmia (redness), serous exudation (vesicles), and suppuration (pustules), and even deep-seated inflammation and suppuration. These results, however, are caused just in the same way as they would be by other foreign bodies, such as an animal parasite—the *Acarus scabiei*, or an inanimate body—a splinter.

The dermatophytæ do not exercise any noticeable or characteristic influence on the general organism, the constitution, or the general nutrition and function of the body. All assertions of any injurious influence of the dermatophytæ are either based on erroneous interpretation of existing conditions or are quite arbitrary.

As regards the *course* of the dermatomycoses, there is little to be said under the head of general remarks, for each form has its special peculiarities, which will be dealt with in detail in the proper places. This much may be said, however, that all of them, as a rule, have a chronic course, and it is only in one kind (Tinea tonsurans maculosa), or only in isolated patches of skin, that the course may be acute or of short duration. Under any circumstances, the course, locally, depends on the progress of the fungus. Wherever the growth of the latter is hindered, or it does not find a suitable substratum, the process must be checked.

[1] De Bary, l. c., p. 215.

[2] De Bary, l. c., p. 215.

The *prognosis*, as a rule, is favorable, as we are always in a position to remove the epidermic layers in which the fungus has established itself, and when this is done the disease is removed. It is only when the fungus has penetrated into the epidermic strata of the follicles, and the hair itself, that any special difficulty is experienced.

The *treatment* of the dermatomycoses, owing to the uniformity of cause and the general, though not strictly accurate, agreement of the morbid symptoms in all the forms to be described, is pretty uniform. At all events, it depends, in all, on the same (etiological) principle, and is directed to the removal of the parasite in a suitable manner and with as little injury to the skin as possible, and, ultimately, to the destruction of the reproductive power of the fungus, because with its removal, or destruction, the other morbid symptoms will subside.

General Etiology.

We need not, here, again cite the proximate etiological influence of the dermatomycoses, the vegetable parasites. This is, indeed, included in the designation given to the diseases in question.[1]

We have, rather, here, to discuss the general and special influences which act directly or remotely as occasional causes, or are presumed to do so.

We must first of all note that any circumstances, such as moisture and warmth, stagnant air, "uncleanliness," and "a state of quiescence" which favour the development and growth of ordinary mould-fungi on all sorts of objects, such as fruit, linen, &c., will also, quite comprehensively, very frequently occasion, or favour, the appearance of certain dermatomycoses. For this reason, we very frequently see tinea tonsurans make its appearance in persons who live in damp, dull, badly-ventilated dwellings, and whose utensils, clothes, linen, &c., are covered with mould and have a mouldy smell. After sojourning at a bath resort, or after a cold-water cure, during which patients live in damp rooms or spend much time in them, or have damp, mouldy linen, bathing clothes, towels,

[1] We need take but slight notice of the opinions of a few who admit the presence of the fungi in question, but do not consider them to be the cause of the diseases with which they are associated; among them are Cazenave, Devergie, and Erasmus Wilson, the latter taking this standpoint in a communication as late as 1864 "On the Phytopathology of the Skin and Nosophytodermata."

&c., in contact with their skin, many individuals suffer from herpes (tinea) tonsurans. From the continual use of warm moist applications to wounds, &c., we may often see red, desquamating circles, like those of herpes (tinea) tonsurans, develop, or even favus, as pointed out by Hebra in 1854 and myself in 1871.[1]

This conjunction of circumstances, though not demonstrative of the truth of the view of Hebra and others, above mentioned, as to the common mould-fungi being capable of causing the skin affections under discussion, yet affords it noteworthy support. We may, assuredly, from these facts, come to the conclusion, that the same conditions which specially favour the vegetation and spread of the common moulds, also further the growth of the fungi causing the skin affections, and, therefore, the development of the dermatomycoses.

A second remote cause of origin and diffusion of dermatomycoses lies in their contagiousness. All parasitic skin diseases must necessarily be contagious, and, therefore, the dermatomycoses. As regards favus and tinea tonsurans, communicability has been fully demonstrated by experiments, as well as clinically. As regards pityriasis versicolor, the proof is not so clear, but Köbner has published[2] one case in which he succeeded in inoculating the fungus from a case of pityriasis, on his own person (and on a rabbit). Communicability may easily, however, be taken for granted in reference to this mycosis, without any further proof.

The transmission of the forms of disease mentioned occurs mechanically, by the direct inoculation of the particular parasite, from one part of the skin to another, from one individual to another, from certain of the lower animals who are subject to the same mycoses, such as mice, cats, dogs, oxen, horses, and fowls, to men, and inversely.

Owing to their contagiousness, the mycoses are relatively much more common amongst persons who have much intercourse with one another, or dwell together, in families, boarding schools, &c.

A third influence which must be regarded as a remote cause of the dermatomycoses is a predisposition on the part of the individual, and this requires a little explanation. It has been advanced repeatedly, and in various senses; at one time, as applied to the skin itself; at another, as applied to the constitution.

As regards the skin, experimental inoculations of favus and

[1] 'Archiv für Dermatolog. und Syph.,' 1871, 3 II.

[2] 'Experiment. Mittheilungen,' p. 24.

ringworm have shown that it was certainly not a question of special sensitiveness of the skin, but that the success of the inoculation depended, principally, on the method and technical skill brought into play.

As regards the origination of the mycoses in other ways than by experiments, and, especially, as regards their growth, the skin of one individual does seem to afford a better source of nutriment than that of a second, or third, under similar conditions. Individuals exposed to the same disadvantages and in communication with one another are not all attacked by the same mycosis. The same mycosis does not always develop to an equal extent, and last the same time, in all the individuals affected. Some persons are much more liable to fresh contagion than others.

This obtains, especially, in pityriasis versicolor, which, apparently, flourishes only on skins predisposed to its attacks, and is then very liable to recur, even though radically removed.

On the other hand, I do not know any sort of constitution or dyscrasia which directly predisposes to attacks of the dermatophytæ. When Bazin states that scrofula predisposes to favus, and syphilis to tinea tonsurans and alopecia, he cannot quote any evidence in support, leaving out of consideration the fact that alopecia is not a parasitic disease.

If favus is met with much more frequently, by comparison, in individuals affected with severe symptoms of scrofula, suppuration of lymphatic glands, caries of bone, and marasmus, and those who are living under unfavorable conditions, than in well-to-do and well-nourished individuals, the explanation of this does not lie in the state of the constitution, but in the external conditions, the want of personal and surrounding cleanliness and care, which allow of the unmolested germination of the fungi.

Under any circumstances, whether by experimental or accidental inoculation of the dermatophytæ, in order for them to "take" and proliferate, it is necessary that the transplanted germs should remain undisturbed. Anything which interferes with their remaining quiescent—washing, rubbing, scratching, and, especially, the manipulations connected with "cleanliness"—are fatal to their growth; all conditions of an opposite character—long detention in bed, neglect of personal cleanliness, &c., favour their development.

General Diagnosis of the Dermatomycoses.

As in all other dermatonoses, so in regard to the cutaneous affections due to fungi, the diagnosis rests chiefly on the clinical symptoms. These, as a rule, are so significant that attention to them suffices for the diagnosis.

In some cases and in certain stages of these diseases, the demonstration of the parasitic fungus at once renders a doubtful diagnosis certain.

For this reason, and to satisfy the demand for scientific accuracy, it is necessary in special cases, or, generally, for demonstration, or for self-satisfaction, to see the parasitic vegetable in question.

It is only in favus scutula (which are, also, easily recognised by the naked eye) that dermatophytæ are heaped up in large masses, portions of which may be examined under the microscope and their nature recognised, without any further preparation. In the hairs and epidermic layers, the fungus can only be seen under the microscope, when the hair or epidermis has been acted on by a moderately strong potash solution (1 gramme in 50; about 10 grs. to the ounce) or acetate of soda, &c., and dissolved, loosened, and rendered transparent, by which chemical process the fungoid elements become somewhat swollen, isolated, and much more conspicuous, but are not otherwise altered.

Some practice is needful to ensure success in the discovery and to avoid self-deception.

Classification of the Dermatomycoses.

Our classification of the dermatomycoses, that is, the determination of their number and special subdivisions, will be influenced, chiefly, by our views as to the natural history of the fungoid organisms, in general, met with in these affections, and as to the scientific value of individual mycological discoveries.

From the historical critical account we have given at pages 114—138, it will be noticed that we have disregarded certain isolated statements to the effect that in a number of diseases, certainly not hitherto regarded as parasitic, such as prurigo, psoriasis, eczema, warts, &c., fungoid organisms have been discovered, and that we have not reckoned these forms of disease amongst the parasitic affections.

It will also be evident that even in regard to the restricted number of dermatoses which are much more generally, and, in part,

universally recognised as due to vegetable parasites, great differences of opinion exist as to essential details.

These chiefly concern the question as to whether, amongst the few affections generally recognised as mycoses of the skin, there are not some which ought to be considered non-parasitic.

Another question is, whether all, or several kinds do not owe their origin to one and the same fungus, and, therefore, ought to be placed together in a single class, or in separate groups; whilst an opposite view maintains the specificity of the individual historical forms.

This divergence of opinion as to essentials, as well as in regard to some important and some unimportant details, is more or less markedly expressed in the various modern special treatises on parasitic diseases of the skin.

For instance, Bazin, in his work on the 'Parasitic Affections of the Skin,'[1] which has been translated into German by Kleinhans, and is much quoted by English authors, divides the cutaneous parasitic fungi, without regard to their natural history and solely on the basis of their localisation, into three groups—trichophyta or onychophyta, epidermophyta, and epitheliophyta, and the dermatomycoses are also arranged in three classes.

The first of these, caused by the tricho- or onychophyta, comprehends the tineæ—(1) Tinea favosa (favus); (2) Tinea tonsurans (herpes tonsurans), including onychomycosis and sycosis parasitaria; and (3) Tinea pelada (ophiasis and alopecia areata), including the varieties pelada achromatosa and pelada decalvans.

The second class, corresponding to the epidermophytic fungi, comprehends the parasitic maculæ, and includes not only pityriasis versicolor, but, also, chloasma or macula gravidarum !, and the ephelides !, affections which, as is well known, are not in any way connected with fungi, but are due to a pigmentary hyperplasia of the rete Malpighii.

(The third class consists of affections of mucous membranes.)

Whilst Bazin, apart from the grave errors here pointed out and some others, shows evidences of great experience and excellent powers of observation in matters of clinical detail, but seems to have only vague conceptions of the natural history of the dermatophyta, and cautiously avoids explanations, Tilbury Fox takes up

[1] Bazin, 'Die parasitären Hautaffectionen,' deutsch von Kleinhans, Erlangen, 1864.

this aspect of the question as the most important, and deals but little with clinical facts.

Tilbury Fox[1] designates all the dermatomycoses as Tineæ; Tinea favosa, T. tonsurans, T. circinata, T. sycosis, T. decalvans, T. versicolor. To these he adds Tinea polonica (!) and Tinea tarsi (!) (Blepharadenitis) as parasitic affections—an anachronism which does not require any further remark.

The observations with which the greater part of his work is taken up, as to the natural history of the dermatophyta and their relationship to one another and to the mould fungi, do not evince that masterly critical treatment of the facts of the case which is indispensable to the elucidation of such an intricate subject.

The author is led, on the one hand, into some eccentricities on mycological matters (see in Fox, loc. cit., page 176, the very curious scheme of the connection of the fungi with one another —*Mucor, Penicillium,* and *Aspergillus* are various forms of the same fungus!, page 174), which de Bary characterises by still severer language, and, on the other hand, clinically, to the view that all the dermatomycoses, from favus to pityriasis versicolor, may develop from and into one another, just as the fungi associated with them, including *Aspergillus, Mucor, Penicillium, Oidium, Chionyphe, Sarcina, Puccinia,* may all develop from and be converted into *Torula* as a common primitive form.

The two special works quoted show that Bazin, in spite of ignoring mycological processes in a way hardly excusable at the present day, gave a reliable account of the dermatomycoses, owing to his strictly adhering to clinical facts; whilst Tilbury Fox, who ascribed less value to the latter than to misunderstood experimental and mycological observations, has only introduced confusion into our ideas in regard to the dermatomycoses.

In contrast to the above, we need only just call attention, in passing, to Anderson's work on the 'Parasitic Diseases of the Skin.'[2] This author includes under parasitic affections of the skin, only favus, herpes (tinea) tonsurans, and pityriasis versicolor, alopecia areata being added for convenience, and gives, on the whole, an excellent clinical description of these forms. At the same time, after a critical examination of the before-mentioned clinical, experimental, and mycologico-botanical facts, he unreservedly commits himself to

[1] 'Skin Diseases of Parasitic Origin,' London, 1863.

[2] 'On the Parasitic Affections of the Skin,' London, 1868.

the view that all these forms represent distinct morbid processes and spring from special parasites.

In the historical introduction, I have mentioned the general considerations which would lead us, for the present, to regard the dermatomycoses, which clinically seem distinct from one another, as being, really, special forms of disease, and the fungi associated with them special contagia.

As I shall deal with these considerations in more detail in the special part, and as I exclude the forms of disease asserted to be parasitic, but not hitherto proved to be such (alopecia areata), and also those in which evidences of fungus are only found now and then, such as impetigo contagiosa faciei, erythema and herpes iris,[1] I have only to treat, now, under the head of phytoparasitic diseases of the skin, of—

1. Favus and the fungus *Achorion Schönleinii.*

2. Tinea (herpes) tonsurans and the fungus *Trichophyton tonsurans,* Malmsten.

3. Pityriasis versicolor and the fungus *Microsporon furfur,* Eichstedt.

We have already explained our views as to the parasitic significance of the fungus met with in "Sycosis parasitaria" and "Eczema marginatum," when treating of sycosis (vol. ii, p. 305, &c.), and of eczema (vol. ii, p. 112 and *appendix* to present vol.), and we shall recur to the subject by-and-bye.

Alopecia areata, which we do not consider a parasitic disease, has also been fully treated of, at p. 206, &c., vol. iii.

[1] See my communications on "Impetigo faciei," &c., 'Wr. Med. Presse,' 1871, and "Zur Ætiologie des Erythema multiforme," &c., 'Arch. f. Dermat. u. Syph.,' 1871, 3 H.

FAVUS.

(*Tinea favosa, T. vera, T. lupinosa ; Porrigo lupinosa, P. favosa ; Teigne faveuse ; Honeycomb ringworm ; Erbgrind*)

History.[1]

Even Celsus and his followers made use of the term favus, not, indeed, in its present sense, but as a designation for honey-like secretions from the skin, called Κήρια, ceriones, meliceris by other older authors (Galen, Oribasius, Paul von Aëgina, Aëtius, &c.), and distinguished from achor and favus.

The Arabians (Rhazes), also, called honey-like crusts favus, whilst (according to Avicenna) they appear to have known the disease now recognised by that term, as Sahafati sicca, or (according to Haly Abbas) as Alvathim.

Stephan Antiochus, who translated the work of Haly Abbas in 1127, derives the term tinea, still in use at the present time, from Alvathim, by contraction into thym, tima, and tinea. It seems more probable, however, that Mercurialis is correct:[2] appellata vero sunt tinea ad similitudinem illius animalis quod vestimenta corrodit et tinea nuncupatur.

The medical writings of the middle ages, such as those of Guy de Chauliac,[3] Gordon,[4] Roger v. Parma,[5] Arnold v. Villanova,[6] Camper,[7] Libaut,[8] &c., show conclusively, that they were acquainted with favus at that time, but that they confounded it, under the common designation of tinea, with other diseases of the hairy scalp, such as porrigo, achor, psydrazia, alopecia, &c. In the writings of the physicians of the sixteenth and seventeenth centuries, such as J.

[1] See Hebra, 'Atlas der Hautkrankheiten,' Text, p. 7.
[2] 'De Morb. Cutaneis,' Venetiis, 1601, p. 52.
[3] 'Chirurg. Tract.,' vii, cap. 1, Venetiis, 1490.
[4] 'Lilium Medicinæ,' Venet., 1494.
[5] 'De Chirurg. liber.,' 1546.
[6] 'Opera omnia,' Basil, 1585.
[7] 'Practica nova.,' Venet., 1522.
[8] 'De l'embellissement et ornement du corps humain,' Paris, 1852.

Manardus,[1] Ambrosius Paré,[2] Hafenreffer,[3] Guyon,[4] Sennert,[5] and Mercurialis, we also fail to find any exact account of favus. It is worthy of note that the latter author says :[6] in hoc tamen conveniunt omnes, quod humor qui emanat e favis est similis melli consistentia unde modo meliceris modo cerium jure appellatum est, since it shows that, at that time, the teaching of the Greeks and Romans was followed in regard to the meaning of the term favus.

The celebrated surgeons of the next century, such as J. Lanzoni,[7] Heister,[8] Turner,[9] Rosen von Rosenstein,[10] &c., did just as little to define this disease, and contented themselves with subdividing tinea into true and false, innocent and malignant. Lorry[11] says, on this matter, morbus vero quem hoc nomine cum Arabico-Latinis auctoribus designamus a Græcis cum favis, achoribus, lactumine, &c., confundebatur. He was the first to speak of only one tinea, which manifestly corresponded to our favus.

Plenk[12] mentions a scabies capitis favosa, but, from his description, it is clear that he understood this term in the sense attributed to it by the Greeks, whilst under the term scabies capitis lupina, and, in another place, under the title tinea vera seu crustosa, he describes, shortly, affections of the scalp which may be regarded as favus.

Bateman[13] defines favus as pustules of a straw-yellow colour, and distinguishes porrigo favosa of the scalp from that of the face, both of which, however, do not correspond to favus in our sense of the term, but to impetiginous forms of eczema. In Willan and Bateman's atlas[14] we do not find any illustration of favus. For, porrigo

[1] 'Epistol. medic.,' Lutet., 1528.
[2] 'Opera lat.,' per. J. Guillemeau, Parisiis, 1582.
[3] *Πανδοχειον αιοδερμον*, Tübingæ, 1630.
[4] 'Cours de Médecine,' Lyon, 1664.
[5] 'Opera Medica,' Lugd. Batav., 1676.
[6] L. c., p. 43.
[7] 'Joh. Lanzoni, opera.,' Lausannæ, 1738, iii.
[8] 'Institutiones Chirurgiæ,' Amstelodami, 1739.
[9] 'Abhandlungen v. den Krankheiten der Haut, aus dem Engl.,' Altenburg, 1766.
[10] 'Anweisung zur Kentniss der Kinderkrankheiten,' aus dem Schwedischen, 1768.
[11] 'Tractat. de morb. cutaneis,' Parisiis, 1777, p. 462.
[12] 'Doctrina de morbis cutaneis,' Viennæ, 1783, p. 75 und 81.
[13] 'Praktische Darstellung der Hautkrankheiten, nach Willan's Systeme bearbeitet von Th. Bateman, aus dem Engl. übersetzt,' von Abr. Hahnemann, Halle, 1815, p. 262.
[14] 'Delineations of Cutaneous Diseases,' &c., by the late Dr. Willan, completed by Thos. Bateman, London, 1817, Pl. 41 and 42.

scutulata, which some authors recognise as favus, does not correspond to this malady, but to herpes (tinea) tonsurans; and Bateman gives no illustration of porrigo lupinosa, which, according to the description, does represent favus.

Alibert[1] was the first to publish such an illustration, in his atlas (Pl. I), under the name teigne faveuse. He, however, and also his followers and contemporaries, Rayer,[2] Biett,[3] &c., were still of opinion that the peculiar bodies and masses met with in favus arose from the drying up of pustules.

Mahon[4] was the first to arrive at the right conclusion that favus did not begin with pustules,[5] and that the disease was contagious.

Mahon, notwithstanding, however, shared the opinion of Sauvages and Murray, that the seat of favus was to be found in the sebaceous glands, whilst Baudeloque[6] referred it to the hair follicles, and Letenneur[7] to their orifices.

As already mentioned in the general part of this section, Schönlein's[8] discovery, made known in the year 1839, of the fungous nature of the peculiar favus masses, suddenly threw fresh light on this disputed question, though, indeed, two years previously, Remak[9] had shown that the masses consisted of structures differing essentially from what was found in pustules and their dried-up products.

In a short time, and especially after Gruby, in the year 1841,[10] had given a very exact description of the microscopic peculiarities of the favus fungus, a number of pathologists tried to settle conclusively the nature, and accurately study the characters of the

[1] 'Description des Maladies de la Peau,' &c., par J. L. Alibert, Paris, 1815, p. 2.

[2] 'Traité, théorique et pratique, des Maladies de la Peau,' par Rayer, Paris, 1826, i, p. 497.

[3] 'Abrégé pratique des Maladies de la Peau.'

[4] 'Recherches sur le Siège et la Nature des Teignes,' par Mahon jeune, Paris, 1829.

[5] L. c., p. 6.

[6] "Recherches et Anatomiques et Médicales sur la Teigne faveuse," 'Révue Médicale,' 1851.

[7] 'Quelques Recherches sur le Favus,' Paris, 1839.

[8] "Zur Pathogenie der Impetigines," 'Muller's Archiv,' 1839, p. 82, T. iii, fig. 5.

[9] Hube, 'De morbo scrophuloso, Diss. inaug.,' Berol, 1837, and, subsequently, Remak, 'Med. Vereinszeitung,' 1840, Nr. 16.

[10] Gruby, 'Comptes rendus des séances de l'Acad. des Sciences de Paris,' 1841, 72, and ibid., 1842, t. xv, p. 513.

newly-found favus fungus named by Remak[1] *Achorion Schönleinii:* such as Langenbeck and Fuchs,[2] Müller and Retzius,[3] Bennet,[4] Wilson,[5] Lebert,[6] Robin,[7] Vogel,[8] Hannover,[9] Wedl,[10] Ardsten,[11] G. Simon,[12] Bazin,[13] Küchenmeister,[14] &c.

Though the works of the authors named are not by any means of equal value in elucidating the development and course of favus, and the significance of the fungus of which it is made up, yet, in their totality, they have resulted in our obtaining considerable certainty in our knowledge of this disease.

The later works of Hebra,[15] Bärensprung,[16] Bazin,[17] Köbner,[18] Gudden,[19] Pick,[20] Neumann,[21] Th. Simon,[22] Tilbury Fox,[23] Anderson,[24] and, especially, those by skilled botanists, such as Hallier,[25] Hoff-

[1] Remak, 'Diagnost. und pathol. Untersuch.,' Berlin, 1845, p. 193, figs. p. 5 u. 6.

[2] Holscher's 'Annalen,' 1840, H. i, and Fuchs, 'Die krankhaften Veränderungen der Haut,' Göttingen, 1842, 2 B.

[3] 'Muller's Archiv,' 1842.

[4] 'London and Edinb. Med. Journal,' June, 1842.

[5] 'On Ringworm,' &c., London, 1847.

[6] 'Physiologie Pathologique,' t. ii; 'Mémoire sur la Teigne,' Paris, 1845, p. 477.

[7] 'Des Végétaux Parasites,' &c., Paris, 1845. See, also, as to the bibliography of favus down to the year 1853, this author's 'Histoire naturelle des Végétaux Parasites,' &c., Paris, 1853, p. 477, *et sequ.*

[8] 'Patholog. Anatomie,' 1845, p. 399.

[9] 'Müller's Archiv,' 1842, T. xv, figs. 7, 8 u. 9.

[10] 'Grundzüge der pathologischen Histologie.' Wien, 1854.

[11] Ad. Ardsten, "D'une nouvelle espéce de Végétaux dans le Favus," 'Gaz. des Hôpitaux,' Paris, 1851, 14 Octobre, p. 477-8.

[12] 'Hautkrankheiten,' &c., Berlin, 1851.

[13] 'Recherches sur la nature et le traitement des Teignes,' l. c.

[14] Küchenmeister, 'Die in und an dem Körper des lebenden Menschen vorkommenden Parasiten,' Leipzig, 1855.

[15] Hebra, 'Med. Jahrb.,' 1854, l. c. und 'Atlas der Hautkrankheiten,' l. c.

[16] Bärensprung, 'Annalen der Charité,' 1855 und 1862, at various parts.

[17] Bazin, l. c.

[18] Köbner, l. c.

[19] Gudden, 'Beiträge zur Lehre von den durch die Parasiten bedingten Hautkrankheiten,' Stuttgart, 1855.

[20] Pick, l. c.

[21] Neumann, l. c.

[22] Th. Simon, 'Arch. f. Dermat. u. Syph.' 1872 und 1873.

[23] Tilbury Fox, l. c.

[24] Anderson, l. c.

[25] Hallier, l. c.

mann,[1] Zürn,[2] and others, have pre-eminently discussed the general question of the relationship of favus to the other mycoses, and in various ways thrown light on the subject, as well as placed the treatment of the disease on a rational basis.

A very few authors, like Fuchs[3] and Gibert,[4] about 1840, and like Cazenave,[5] and Chaussit,[6] subsequently, and, in part, even at the present time, have remained steadfast to the old view, or, though recognising the achorion, ascribe to it a wholly secondary function, like Devergie[7] and Er. Wilson.[8]

Definition.

By favus (Tinea vera, T. favosa, T. lupinosa; Porrigo lupinosa, P. favosa; Teigne faveuse; Honeycomb Ringworm) we understand a contagious disease caused by a microscopic fungus, the *Achorion Schönleinii;* mostly occurring on the scalp, more rarely on parts of the body free from hair, or in the substance of the nail; characterised, when it occurs in the first-mentioned locality, by the formation of sulphur-yellow masses—the so-called favus bodies or favus individuals—of the size of lentils or fourpenny-pieces, disc-shaped, depressed in the centre, perforated by hairs, situated between the layers of the epidermis, and made up of fungus elements; and causing atrophy of the hair and of the skin to follow in the parts affected.

Symptomatology.

The symptoms of favus vary in many respects according as to whether it occurs on the scalp, on parts of the body free from hairs, or in the nails. We shall, therefore, describe the symptoms as presented in these various localities.

[1] Hoffmann, l. c.

[2] Zürn, l. c.

[3] Fuchs, 'Die krankhaften Veränderungen der Haut,' Göttingen, 1840.

[4] Gibert, 'Traité pratique des Maladies spéciales de la Peau,' Paris, 1840.

[5] Cazenave, 'Leçons sur les Maladies de la Peau,' Paris, 1845, 1856. Schedel et Cazenave, 'Abrégé pratique,' &c., Paris, 1859, p. 154.

[6] Chaussit, 'Traité élémentaire, &c., d'aprés, &c., Cazenave,' Paris, 1853.

[7] Devergie, 'Traité pratique des Maladies de la Peau,' Paris, 1857.

[8] Wilson, 'On the Phytopathology of the Skin,' London, 1864.

FAVUS OF THE SCALP.

Development.

We can study the development of favus at any time, and best of all on the scalp, in a case where the disease is already far advanced, after the accumulated favus masses have been removed by the application of emollient remedies (cataplasmata, inunctions with oil, maceration under a waterproof covering, &c.), followed by washing with soap.

The scalp then appears clean.

After a few days, white scales make their appearance on the diseased parts without any definite arrangement. The appearance resembles that of the so-called pityriasis capitis, observed, as a rule, after the removal of psoriasis scales, or in the last stage of eczema capillitii.

In the course of the third week, we see, here and there, a disc of the size of a millet seed, perforated by a hair and of a sulphur-yellow colour—the favus scutulum in course of development.

This lies beneath the epidermis surrounding the forthcoming hair, and is seen through it.

In the course of the next few days, the yellow mass increases into a large flat disc of the size of a small lentil. At the same time, the peripheral portion of the epidermis projects, whilst the central part immediately surrounding the hair remains at the same level or becomes somewhat depressed. In this way, the scutulum comes to resemble a little cup—favus urceolaris.

By means of a blunt instrument, such as a director, we can penetrate the border of the scutulum without using any particular force. We only perforate a moderately thick layer of epidermis. We can now push the probe without any difficulty under the favus crust. As we turn the latter over, with its under surface uppermost, we find that the latter is convex, smooth and moist, and dips into a corresponding depression in the rete.

If, however, we wish to remove the favus mass bodily, we must tear through the epidermis around the periphery, and then draw it along the hair by which it is perforated in the centre.

When we have done this, we find we have in our possession a hemispherical structure with a canal in the centre. Its under, convex

surface is smooth, somewhat greasy to the touch. The whole mass consists of fungus elements, as we can easily demonstrate under the microscope, and crumbles easily in the fingers. The upper surface is slightly concave, made up of white, dry epidermis, which is intimately united to the favus mass. The scutulum is also surrounded by a fringe-like margin of epidermis, which, before removal, was continuous with the surrounding epidermis.

When the favus crust is removed, there remains a corresponding depression, whose surface is covered with a viscid, serous, or blood-stained fluid. It resembles an ulcer, or loss of substance.

A closer examination, however, shows clearly that the surface of the pit is still covered with epithelial cells, and that, therefore, there is no ulcer. After an interval of a few minutes, only, the base of the pit begins to rise, owing to the cells of the rete, which were previously compressed by the favus mass intercalated in the layers of the epidermis, now springing up again, as soon as relieved from the pressure, and, as they become dry, they resume the level of the surrounding parts.

The further course of the favus depends on the progress of the growth of the fungus superficially and deeply.

If left to itself and unimpeded in its growth, the favus scutulum spreads superficially, till it attains the size of a fourpenny-piece or more. The central, oldest portion becomes, in the mean time, of a whiter colour, more resembling that of epidermis, the peripheral and younger portion appears yellower and, at the same time, is more prominent, though the central depression, coincidently with increase in circumference of the favus disc, seems less deep. At the same time, the surface shows furrows in concentric rings, and the whole structure, in proportion to its size and the appearance of the individual signs mentioned, is comparable to "crabs' eyes," honeycombs (hence "favus," honeycomb ringworm of the English), or to a little cup (French, godet, godet de favus—favus urceolaris, cup-forming favus), or to a little shield (favus scutiformis).

Each separate favus scutulum is limited as to its growth and the period of its existence. Having attained a certain size and lasted for some months, it loses its yellow, deep colour and becomes pale, dry, straw-yellow or dirty-white, it projects at the margin beyond the level of the surrounding parts, and, together with its epidermic covering, separates from the adjacent epidermis and then falls off, owing to some mechanical injury, friction or scratching, or sponta-

neously. In its place, there always remains a superficial depression of the cicatrised, atrophic, bald cutis, covered with thin, glistening, parchment-like epidermis.

Another time, the favus mass, having attained a certain size, does not spread any more in circumference, but, after the epidermic envelope covering it has partially given way, grows freely from the surface. In this way, we find heaped-up, irregular favus masses formed.

As we shall show in more detail further on, the favus growth is not confined to the space between the uppermost and middle layers of the epidermis around the hair, where leaving its follicle. It is more probable, as indeed early observers, especially Wedl, showed, that the fungus, not, perhaps, in conglomerate masses, but by numerous offshoots, grows between the layers of cells of the root-sheath of the hair, and, probably, from the loosely arranged cells of the hair-root, upwards, in the layers of the cortex of the hair (see Fig. 7).

The results of the growth of the fungus here indicated are shown, clinically, by the hair thus affected losing its gloss in course of time, looking as if covered with dust, becoming loosened, owing to the disturbance of the cells of the root-sheath, so that it can be drawn from its follicle by the slightest traction of the finger, a portion of the loosened root-sheath, enveloping the hair like a sheath, being drawn out with it; and, lastly, by the hair, at a later stage, falling out spontaneously, and the follicle becoming obliterated, the papilla of the hair having, probably, previously become atrophied, owing to pressure from the growing fungus, and no other hair being ever developed at this spot.

The rather complicated and very varied clinical symptoms of an advanced or highly developed case of favus of the scalp arise from the appearances presented by the separate favus cups and their local results, and, also, their combinations.

We find, for instance, separate cups typically developed at certain parts of the scalp. Subsequently, several of them appear agglomerated into a common mass, the periphery of which still runs in regular curved lines, corresponding to the circumference of the separate favus cups. At other parts, where separate favus masses had agglomerated, and subsequently shrivelled and fallen off, an atrophic, cicatricial, bald centre has formed, whilst the peripheral favus cups have developed uninterruptedly, and fresh follicles have become attacked. Or there may have been no central atrophy of

these aggregate masses, but, on the contrary, exuberant growth, so that there are irregular, yellowish-white, dry accumulations, projecting several lines above the level of surrounding parts, and hard, like gypsum or mortar, or the separate nummular or shield-like favus crusts comprising them may even yet be quite distinct.

Owing to the different appearances caused, clinically, by these and other possible combinations, changes in form, colour, &c., it was formerly thought advisable to subdivide favus into different kinds, such as favus urceolaris, vulgaris, scutiformis, scutulatus, disseminatus, sparsus, squarrosus, suberinus, turriformis, achatinus, squamosus, granulatus, lupinosus, nummularis, figuratus, en cercles, en groupes, en anneaux, indépendant, isolé, à petits écus, &c. It is evident from what has been stated, that these designations can only indicate temporary conditions and stages of favus, and, certainly, not special varieties of the malady.

The clinical aspect of the disease due to the favus masses themselves is rendered complete by the symptoms which arise as direct or indirect results of the growth of the fungus in the hairs or on the scalp. Over the areas affected by favus, the hairs are dull, lustreless, as if covered with dust, dry, and easily extracted. In the midst of such a patch of altered hairs, there are often tufts of normal hairs, whose follicles have remained unaffected by the favus. The hairs also which are situated outside the islands of favus are quite normal.

Also, in cases where favus has lasted for years, there will be patches of skin, here and there, unaffected, bald, in a state of cicatricial atrophy, covered with parchment-like epidermis, stretched tightly over the bone, and, occasionally, having on them separate hairs or tufts in a quite normal condition, which have escaped the process of destruction set up by the favus.

This atrophy, baldness, and cicatricial degeneration of the skin is the result of mechanical pressure exercised by the favus masses, encapsuled between the layers of epidermis, on the subjacent papillæ, and extending over a period of some years' duration. No fungus has, however, been shown to have penetrated into the layers of the true skin. And what has been said as regards such an infiltration of favus, of the nails, for instance, belongs to the series of numerous other, so-called discoveries of myotic embolisms, metastases and wanderings, to which many have been led by the doctrine in regard to micrococci prevalent of late years, and so much misunderstood.

The only symptoms of a subjective character met with in favus of the scalp are moderate itching and a sense of fulness. No other symptoms than those mentioned, either locally or constitutionally, are ever caused by favus.

Any other phenomena occurring in connection with favus of the scalp are, invariably, accidental complications of the affection. Here may be enumerated, eczematous and pustular eruptions from scratching, induced either by the favus itself, or, as is more usual, by pediculi, which not unfrequently infest heads which have been the seat of favus for years, and have, probably, during the same period been neither combed nor washed.

So, also, swelling and suppuration of the glands of the neck and submaxillary regions, when they occur, are to be regarded as the results of inflammation and suppuration set up by pediculi capitis and scratching, rather than as necessary consequences of favus.

We cannot say we are acquainted with the "favus ulcers," spoken of by some, even recent authors, any more than we are with caries and necrosis of the skull, as direct results of favus. We will, however, willingly admit the possibility of the occurence of the latter as the results of inflammatory complications.

It has been recorded by Th. Simon that atrophy (superficial erosion) of the bones of the skull, in places, had resulted, in a man, from the pressure of favus.[1]

Favus of the scalp invariably follows a chronic course. It extends over many years. Beginning in childhood, the process, if left to itself, that is, especially if its development and extension are not interfered with by cleanliness or treatment, may persist until the patient is thirty or forty years of age, and hold on its course so that, as the parts attacked become more and more numerous, it finally invades the whole scalp, in fact, spreads to all parts provided with hair follicles.

The process then dies out, after the whole scalp has become bald and atrophic, because there are no longer any hair follicles to become infested by the fungus.

Not unfrequently, however, the process ceases much earlier, though the patients may not have been treated, or not systematically so; the favus dies out, leaving behind a single bald patch or several isolated bald patches.

During any intense feverish condition, such as typhus, variola, or

[1] 'Archiv f. Dermat. u. Syph.,' 2 B., p. 544.

pneumonia, favus seems to stand still or to be checked in its progress. Old favus masses then usually fall off. But as a rule, when convalescence ensues, a luxuriant growth of favus again occurs.

FAVUS ON PARTS WHICH ARE NOT HAIRY.

Not only may favus occur on parts which are without hair in the ordinary sense, that is, which have only fine lanugo hairs, but, also, on parts which have really no hairs, but where there are follicles; and there is not a single spot, the glans penis, palm of the hand, or sole of the foot not excepted, on which favus has not been seen. There may be either only a single patch, or several isolated patches; often there is but a single scutulum, whilst, at other times, it occurs in a state of colossal development on the trunk (especially on the back), and on the extremities, particularly on their extensor surfaces. The scutula are, however, of exactly the same character as on the scalp, and there is just the same variety of arrangement, and accumulation in mass.

A peculiar appearance is often combined with the typical aspect of the favus scutula. There are red, scaly, discoid patches, from which are produced circles, scaly or pale in the centre and having a red, elevated margin, half a line in breadth, and smooth or covered with vesicles; and there may be one of these circles only, or several such may surround the favus scutula, concentrically, in a varied manner. For instance, a scutulum appears in the centre of such a patch, the margin of the red patch advances peripherally whilst its centre pales and desquamates, and thus a red circle is produced, which increases to the size of a fourpenny-piece or half a crown, and then disappears. Or a scutulum or several scutula may develop on the line of the red margin itself. Or several segments of circles, joining in serpentine lines, may enclose a central group of favus crusts. Or there may be several or many such circles present, in and on which there may be no scutula, and which, after attaining a certain size, may again pale and desquamate, and disappear.

It was just this form of eruption which, owing to its precise agreement with the phenomena met with in herpes (tinea) tonsurans, and to be described further on, and, also, for other weighty reasons, induced Hebra some years ago to conclude that favus and tinea tonsurans

were only various stages of development of one and the same process and dependent on one and the same cause.

When favus is met with on parts without hairs, especially on the trunk and extremities, it is generally accompanied by favus of the scalp. At any rate, there is no doubt that, in the great majority of cases, the latter is the primary starting-point from which the process, not unfrequently in combination with ringworm-like circles, spreads to the skin of the neck and of the face, and, occasionally, may also extend to more remote cutaneous tracts.

Also, however, there is no doubt that isolated patches of favus may arise independently, on the parts of the body mentioned, without the scalp showing, or having ever shown, any traces of favus.

Favus on parts without hairs is distinguished, essentially, from that on hairy parts, by its comparatively acute development and course. We have repeatedly, both in persons affected with old standing favus of the scalp, and in others who have never suffered from favus, seen red patches and circles develop in an acute fashion, and on these have observed favus scutula make their appearance within 10—14 days, on the back or distributed over the whole body, in the forms described above, and of the size of lentils.

The progress was acute and abortive, for, without any sort of treatment, the scutula fell off in about 4—6 weeks, and the ringworm-like circles also disappeared. This depends, as will be shown by the microscopic conditions to be explained later, on the fact, that the shallow follicles of the lanugo hairs do not afford a safe harbour for the favus fungus.

Nevertheless, favus of the trunk and of the extremities may, in a few cases, persist for months and years, not only in regard to the affection as a whole, but even as to individual scutula, and, indeed, as has been before mentioned, may attain considerable development. When this occurs, there is also, generally, favus of the scalp at the same time, from which fresh inoculations to other parts of the body may constantly occur. Michel reports in detail a case in which favus of the trunk and of the extremities—without favus of the scalp—was supposed to have lasted for more than twenty years.[1] If the scutula have existed for a long time, they leave behind them on the skin of the trunk, &c., after they have fallen off, flat, white, cicatricial depressions which, however, in course of time become more and more superficial and indistinguishable.

[1] 'Berl. klin. Wochenschrift,' 1866, No. 42.

FAVUS OF THE NAILS. FAVUS UNGUIUM. ONYCHOMYCOSIS FAVOSA.

Favus of the nail substance is rather rare. I have only seen a few of the finger-nails, or only a single nail, affected at the same time. I have never seen the toe-nails affected. The disease occurs in two different forms.

At one time—and this is the characteristic form—it has the appearance of a sort of repetition of the formation of a scutulum, consisting in a sharply-defined accumulation of fungus elements, occupying, mostly, the lower, more succulent layers of cells of the nail, and showing through the smooth cellular layers of the nail roof passing over it, as a pale, sulphur-yellow body of varied extent. Favus of this form, easily recognised on account of its characteristic colour, occupies, as a rule, only a limited part of the nail; either at the side, from the nail fold towards the centre; or from before backwards, for a short distance, or even the neighbourhood of the lunula.

At another time, favus of the nails can scarcely be distinguished from any non-parasitic form of degeneration of the nails. The latter are dry, discoloured, opaque, much furrowed, fissured, lifted up anteriorly, split up into laminæ, just as in onychiasis from chronic eczema, psoriasis, lichen ruber, &c.

But, on microscopic examination, mycelium and spores of the same sort, and having the same arrangement, as in the cells of the root-sheath of the hair, are found. Favus of the nails almost invariably originates by direct inoculation from favus of the head or other parts of the body, from scratching, and scarcely ever arises spontaneously. It is, also, almost always associated with a still existing favus of the localities before mentioned, but, not unfrequently, it may last longer than the latter. The ineradicable traces of the same on the scalp, however, the baldness and cicatricial patches, will indicate in such cases the source from which the onychomycosis has originated.

ANATOMICAL CONDITIONS IN FAVUS.

Even to the naked eye, it will be evident that the favus scutulum is intercalated between a superficial and a deeper layer of

the epidermis of the hair follicle, as if in a capsule. The superficial epidermic plate is intimately connected with the mass of the favus, and joins, peripherally, the epidermis of the surrounding parts. The lower, concave surface of the capsule is composed of the compressed deep layers of the epidermis corresponding to the convex under surface of the favus mass, as has been already described at p. 154.

If we wish to remove the favus body *in toto*, we have only to tear through the epidermis beyond the margin of the scutulum, with the aid of a blunt instrument, such as a director. We, thus, at once reach the under, convex surface of the favus scutulum, which is quite unattached to the depression in the epidermis. The whole favus mass may then be lifted up as a flap. This procedure causes the epidermic margin to be torn through all round. If the central, perforating hair is still present, the scutulum must be drawn along the shaft of the hair.[1] If the hair has already fallen out, or is broken off close to its point of exit, the scutulum may be removed at once.

It is a hemispherical body. We can see now, precisely, that the upper surface is intimately connected with the layers of the epidermis. The substance of the yellow body, smooth on its convex surface, consists almost entirely of fungus elements, as we can prove at once by microscopic examination.

The funnel-shaped space around the hair, which is limited at its base, by the uppermost layers of the epidermis passing horizontally to the hair, and, laterally, by the epidermic layers passing downwards towards the follicle, invariably forms the seat where any foreign bodies getting into the follicle accumulate in greatest quantity. Thus, in eczema, variola, or where there is any formation of pustules corresponding to the follicles, as in lichen scrophulosorum,[2] or a syphilide with small pustules,[3] there is always a disproportionate collection of pus in this space.

The same space affords, also, the most convenient seat for the accumulation of the favus mass, and it is certain that in most of the cases of inoculation, the fungus is first of all deposited in this

[1] Not unfrequently, the scutulum is perforated by two hairs which come from the same follicle. The larger favus masses may be perforated by several hairs, but these belong to several adjacent follicles.

[2] Kaposi, 'Ueber Lichen Scrophulosorum,' 'Sitzungsb. d. k. Ak. d. W.,' 1868, math. nat. Klasse,' Octoberh, fig. 2.

[3] Kaposi, 'Die Syphilis der Haut,' &c., mit 76 chrom. Tafeln, Braumüller, 1874, 2 Lief, p. 151, fig. 10.

funnel-shaped space. It has here most room for spreading, and can grow under the protection of the epidermic base of the funnel.

One can satisfy one's self of the truth of this in cases of artificial inoculation. Dr. Peyritsch, who made his experiments[1] on inoculation of favus on his own skin, under our observation, with the greatest accuracy, could ensure the success of his experiment by the aid of this circumstance. He was never so successful as when he pricked the epidermis round a hair, with a needle, and immediately placed a drop of water saturated with favus fungus on the spot, and allowed it to evaporate.

The conformation of the favus body can now easily be understood from the local conditions. In the first place, the fungus grows round the shaft of the hair and shines through the epidermis as a yellow disc. Owing to the continued growth of the favus mass, the epidermic layers limiting the funnel-shaped space are pressed asunder. The epidermis on the surface of the skin immediately surrounding the hair, and intimately connected with its cuticula, cannot be lifted up, or only very slightly so, owing to this fixation. On this account, the central part of the favus scutulum remains of the same level as the surrounding skin. The further away from the hair, the more easily can the epidermis be elevated by the favus mass, growing in superficial area and in thickness. In this way arises the appearance of depression met with in the larger favus scutula, which have a central depression and a prominent peripheral, marginal portion, which, again, slopes gently downwards further outwards.

The deeper, succulent, softer epidermic cells are not only easily separated by the favus mass, from the superficial epidermic layer and from the hair shaft, but are also compressed laterally and downwards. In this way is produced the concave pit in which lies the convex surface of the favus mass, as if in a nest. As soon as the favus mass is removed, the cells which have been flattened out rise up within a few minutes, and the pit vanishes completely in a short time.

Results of Microscopic Examination of the Favus Crust.

Since the time of the detailed examinations, above mentioned, by

[1] "Beitrag zur Kenntniss des Favus," 'Wr. med. Jahrb., 1869,' 2 Heft. p. 64.

[2] Peyritsch, l. c., p. 64.

Schönlein, Gruby, Remak, and Lebert, numerous authors have independently examined, afresh, the microscopic peculiarities of the fungus elements constituting favus.

If we examine in detail the most accurate of these results, such as those of Wedl, Robin, Gudden, Hoffmann, Pick, Hallier, Peyritsch, &c., we shall discover a number of not unessential differences in many details. We must not, however, too hastily attribute this to defects or inaccuracies in the investigations in question.

The only morphological elements presented to our view by the fungus of favus, as has been shown in the general account given of this and the other dermatophyta, are spore-like elements, here to be regarded as gonidia, and mycelial threads. When certain observers came to the conclusion that by giving an exact account of the mycological structures found by them in favus, they could, also, find and fix, once for all, the typical aspect of the favus fungus, and, especially, determine, without any doubt, the distinction between it and the fungus of ringworm, they made a twofold mistake.

In the first place, the fungus from one and the same patient shows the most varied differences in conformation, size, and intimate connection of the gonidia and mycelium, so that the illustrations furnished by one observer may vary greatly from those of another, though, as regards the particular case, each observation may be quite correct. No one illustration or description, however, hitherto furnished, gives an exhaustive picture of all the varieties of the favus fungus.

In the second place, it must be clearly understood, that, contrary to the general opinion, the most minute description of the favus elements, with all the aids furnished by modern science, will not avail to distinguish, conclusively, the favus fungus, from other dermatophyta, and, especially, the fungus of ringworm, for the simple reason that we have only mycelial threads and gonidia before us, and that these—without the organs of fructification—do not afford any differential criterion between two fungi, which closely and essentially resemble each other.

If we look at the accurate and very carefully-executed sketches[1] of my preparations of favus fungus, from the favus crust, from the root-sheath of the hair and from the hair itself (Figs. 5, 6, 7), and, also, at the equally careful and accurate sketches, from ringworm, it will be evident that they are much more com-

[1] Hr. Dr. Jul. Heitzmann has drawn the illustrations with special care and truth from my preparations.

plete than those given hitherto in books, which are in great part diagrammatic. They show, also, that the same forms occur in both these maladies, and do not tally with the statement that certain forms, or a special mode of arrangement of the individual elements, are peculiar to, and characteristic of, favus or ringworm, as the case may be.

For this reason, I do not think it worth while to pay more attention to such statements, for instance, as those of Gudden[1] and Wedl,[2] that they had sought in vain for the fungus of favus in the hair bulb, for in Fig. 7 I have expressly had such a condition shown; or Küchenmeister's opinion, that one seeks in vain for mycelium among the epithelial cells in ringworm;[3] or the statement of most authors, that, in favus, only rows of spores, and, in ringworm, only short threads, are found in the substance of the hair; or the emphatic statement of Bärensprung and many other authors, that the favus fungus is not jointed like a pearl necklace, but shows only smooth-bordered mycelial threads provided with sheaths; whilst the mycelium of ringworm, on the contrary, consists of joints arranged together like a pearl necklace; and the threads of the fungus of pityriasis versicolor do not appear either jointed or divided; and that these features will "manifestly enough" suffice to distinguish these three forms of fungus from one another.[4] For, these statements are contradictory and of little avail in diagnosis, because, as may be seen by Figs. 6, 7, and 8, all possible forms of the kind, described, occur in favus and ringworm, and even in pityriasis versicolor.

However, it cannot be denied that each of the three fungi, *Achorion Schönleinii*, *Trichophyton tonsurans* (Malmsten), and *Microsporon furfur*, met with in the dermatomycoses, has, on the whole, a morphological character peculiar to it. In the achorion, this consists in the predominance of gonidia forms and the great variety they exhibit as to size and conformation, in the comparatively short and remarkably jointed appearance of the mycelium and the scarcity of the smoothly-bordered variety, and the ease with which the mycelium breaks up into single cells; in trichophyton, in the greater tenacity and stretched appearance of the much-branched, and, for the most part, smooth-bordered mycelium and the small number, uniformity, and comparative small size of the gonidia; in

[1] L. c., p. 23.

[2] L. c., p. 743.

[3] Küchenmeister, l. c., 2 Abth., p. 31.

[4] Bärensprung, 'Annalen des Charité-Krankenhauses,' 6 Jahrg., 2 Heft, 1855, p. 125, *et sequ.*

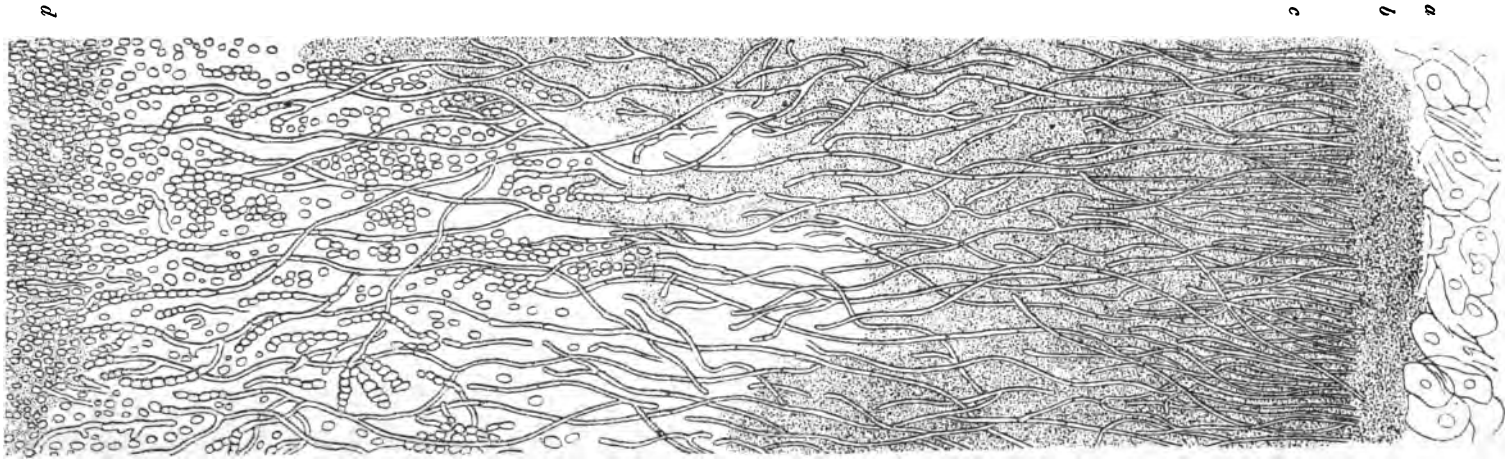


FIG. 5.—Section of a favus scutulum extending from the superficial epidermic covering to its centre; magnified 300 diameters; after Bennett.

microsporon furfur, in the peculiar arrangement of the gonidia in heaps or clusters, and their uniformity and large size.

There is, therefore, much truth, though not absolute certainty, in the statement of Anderson,[1] that a practised observer may diagnose, from the microscopic appearance of the fungi, alone, the particular form of disease to which they belong.

For all that, I must repeat, the morphological differences are not demonstrable in detail.

Under these circumstances, it is evident that it is of less importance if the magnitude of the gonidia and mycelial threads be given by various observers to the $\frac{1}{10,000}$ or $\frac{1}{100,000}$ of a line, and that their statements differ in many ways from one another; or if certain features of the fungus elements, for instance, nuclei, double contours, &c., are not correctly interpreted botanically, by some; or if other errors of detail are met with.

I have thought it better to make these preliminary observations, in order that the details to be given further on, of the fungus forms observed by myself, may not have a greater value assigned them, in reference to any particular form of disease, than I have already indicated belongs to such in general.

Satisfactory microscopic sections through the whole thickness of a favus scutulum are more rarely obtained than could be wished, owing to the friable character of the mass. I have, for this reason, copied one given by Bennett, which shows the state of things in a scutulum very well (Fig. 5). We see, most superficially, at *a*, the epidermis; beneath this, at *b*, a finely granular (viscid) mass, which extends far into the interior of the favus body, between the fungus filaments; at *c*, are densely-packed, simple mycelial threads, which, the further they have reached into the interior, appear more and more branched, and towards the inner surface give off gonidia from their branches, or consist wholly of rounded cells, so that, in the middle of the favus scutulum, gonidia preponderate.

The more minute constituents of the favus scutulum may be examined microscopically without any preparation, or, at least, with the mere addition of a drop of water. We find (Fig. 6), "in addition to organic detritus and granules of varied form and size,"[2] various, short, jointed, simple or branched mycelial threads, a few of which have smooth margins, but most are moniliform; they differ

[1] L. c., p. 170.

[2] Hoffmann, 'Bot. Ztung.,' 1867, No. 31.

much in breadth, some appear broken short off, others have club-shaped, rounded extremities, and others seem to have their terminal

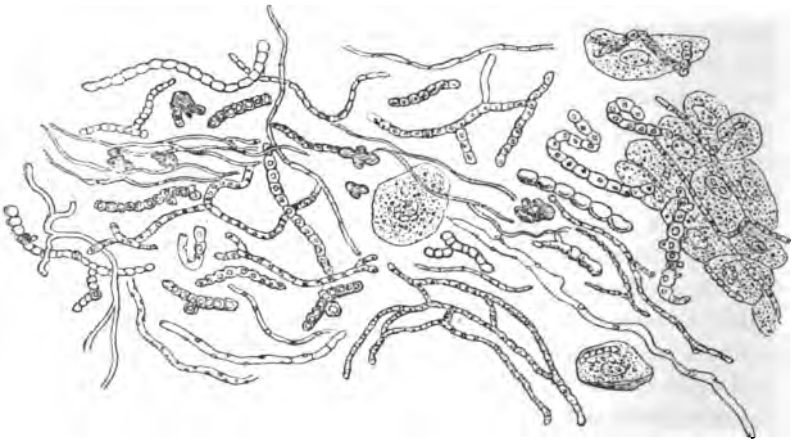


FIG. 6.—Fungus elements from the under surface of a favus scutulum. Hartnack, oc. 3, obj. 9, cca. (700.)

cells continued into a long, one-celled process having a conical end. The mycelial threads with smooth margins are either without septa throughout their whole course, and in their branches, and have no nuclei; or, have septa, and are provided with regularly arranged central or marginal or intermediate structures resembling nuclei. They are comparatively of the smallest calibre. Some of them exhibit quite irregular swellings here and there.

The jointed threads are coarser in structure. The cells composing them are rounded, oval, quadrilateral, polyhedral, regularly hexagonal, without nuclei, or provided with a central structure resembling a nucleus (fat globule?), which in many instances reaches almost to the cell wall, so that such cells appear to have a double contour.

Some of the jointed threads have thrust out a long thread without joints, laterally from a cell.

The mass, however, pre-eminently consists of gonidial forms, round, rounded, oblong, polyhedral, or biscuit-shaped cells, varying greatly in size, isolated, or arranged together in threes, in the form of trefoil (Trefelform) chains, or branched, homogeneous, or provided with one or two nuclei. Some attract attention directly, by their size. Many show a septum; others, one, or even two or three bud-like excrescences, or have thrown out a long, jointed thread.

The finely granular viscid mass holding the favus elements together is a product of the disintegration of the epidermic cells and of the secretion of the glands, and possesses none of the mystery which was attributed to it during the early days of our acquaintanceship with the achorion.

In places, where, as on the upper marginal portion of the favus scutulum, coherent layers of epidermic cells are met with, we see

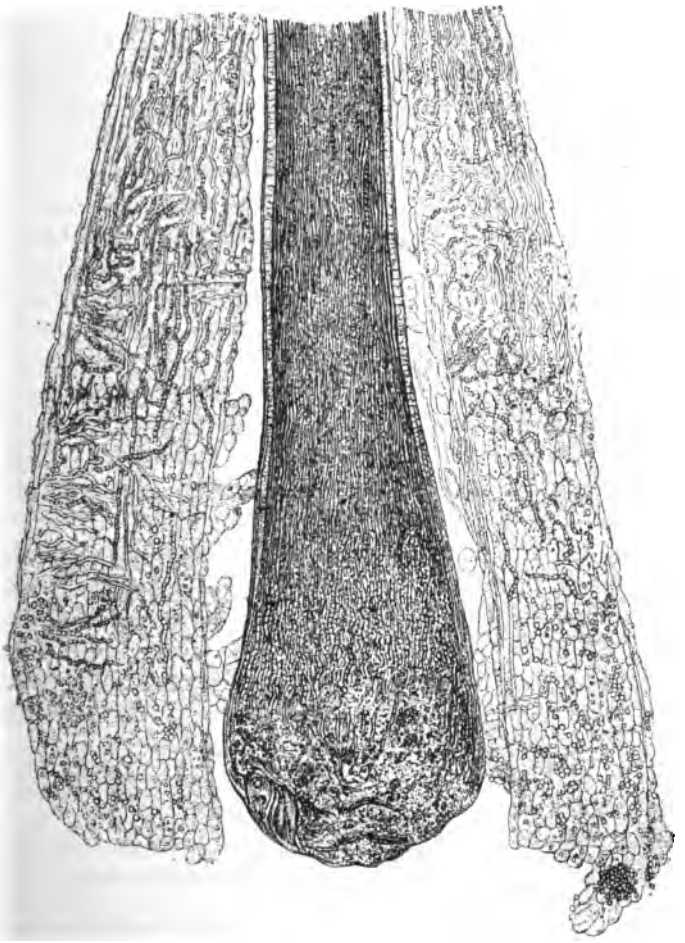


FIG. 7.—Hair-shaft and hair-bulb from favus (Hartnack, oc. 3, obj. 9 à immersion, cca. 700); *a*, hair-bulb; *b b*, hair root-sheath; both being abundantly infiltrated with fungus.

the mycelial threads run along the intercellular spaces, or wind round individual epidermic cells. The favus cells seem also able to penetrate into the interior of some of the epidermic cells.

Results of Microscopic Examination of the Hair in Favus.

If we extract a hair, which comes away easily from the part affected by favus, there generally is removed with it the hyaline, transparent, swollen root-sheath.

In both, in the root-sheath, and in the fibrous layer of the hair, there will be found an abundant network of mycelial threads, gonidia, and gonidial chains, as may be seen in Fig. 7. The mycelial threads and gonidial chains run, for the most part, in the direction of the long axis of the hair, but there are a considerable number of branches which run transversely and obliquely, tendril-like, or loop-forming, in the hair.[1] These structures are not, however, visible at once, but only after the hair and root-sheath have been treated for a long time with solution of caustic potash or soda (1 : 20).

In contrast to the statements of those authors who assert that the mycelial threads do not penetrate deeply into the hair follicle, and, more especially, are never found in the hair root, my preparation, of which a sketch is given in Fig. 7, shows the bulb of the hair infiltrated by a copious network of fungus.

It is quite probable that, in most cases, the fungus growth enters from here, where the cells are succulent and loose, into the substance of the hair, after having reached thus far downwards between the cells of the root-sheath. That previously, however, above the hair-bulb, the fungus may penetrate from the root-sheath, between the cells of the cuticula, into the hair, I do not doubt, as Hoffmann does. For, I have frequently seen an abundance of fungus threads in the upper part of the shaft of the hair, whilst the lower and radical portion appeared wholly free from fungus.

At any rate, the cuticula offers a considerable impediment to the penetration of the fungus into the substance of the hair. For, I

[1] Inexperienced observers may easily mistake the horizontal plaits of the cuticula, for mycelial threads, as, doubtless, happened to Erlach, in examining the hair from alopecia areata (see his treatise, 'Ueber eine neue Fructificationsform der Epiphyten bei Porrigo decalvans,' &c. 'Schweitz. Zeitschr. f. Heilk.,' B. ii, die fig., p. 268).

have, for instance, seen the root-sheath copiously infiltrated, and a few fungus threads coursing between the root-sheath and the hair, and parallel to the latter for a long distance, whilst the hair remained wholly free from fungus.

How far, when once the fungus has entered the hair substance, it can penetrate upwards through it, is also very difficult to determine. Some are of opinion that it can grow to a considerable distance upwards, even beyond the point of exit from the follicle.

It seems to me that this growth within the hair does not reach very high in favus, though the follicular portion of the hair, undoubtedly, may be affected throughout its whole extent. This would explain, probably, the remarkable fact that the hair in favus may lose its lustre, may be easily extracted, and, finally, may fall out, that, in a word, its nutrition may be considerably interfered with, but that, nevertheless, it does not break off so easily, nor so frequently, as it does in ringworm.

In Hoffmann's work on favus, quoted above, there is a drawing of a hair,[1] in which, according to the author, the fungus had not at any part grown more than a certain height above the bulb. Hoffmann, for this reason and also because he has never seen the cuticula penetrated by fungus threads, comes to the conclusion that the latter always reach the interior of the hair from the bulb.

Similar fungus elements to those occurring in the scutula, the hairs, and the root-sheaths, are met with between the layers of the epidermis of the ringworm-like circles, described above, and often associated with favus, as I stated in 1871,[2] and Peyritsch[3] confirmed,[4] and, also, between the cells of the nails in onychomycosis favosa.

In addition to the constituents of the *Achorion Schönleinii* above described, Ardsten, and many other observers since, have found

[1] 'Bot. Zeitung,' 1867, Taf. vi, fig. 3.

[2] Kaposi, "Zur Aetiologie des Erythema multiforme," &c., 'Arch. f. Derm. und Syph.,' 1871, 3 H., p. 394.

[3] Peyritsch, l. c., p. 79.

[4] I lay special stress on this point, because Köbner ('Exper. Mittheilungen') does not make any remark on the presence or absence of fungoid elements in the epidermis of these herpes circles; and it might be suggested, that, in addition to the arguments by which K. seeks to differentiate "the herpetic prefavus stage," from herpes tonsurans, having a similar outward appearance, the absence of fungoid elements might also be taken for granted as a further ground of distinction.

a *Puccinia*, in the favus mass. In the opinion of the majority of authors, this is an accidental admixture.[1]

In regard to the various opinions as to the botanical (mycological) relationships of the fungus of favus, which have been expressed since its discovery by Schönlein, the most essential points have been already alluded to, in the general introduction to the subject. Named by Remak, *Achorion Schönleinii*, the fungus was referred to the order Oidium, Link, by Müller and Retzius,[2] in 1842, and it continued to be so regarded by Robin[3] down to about 1850.

The changes in opinion which began a few years subsequently, and have continued down to the present time, as to the scientific systematic arrangement of the fungi, and of which we have already indicated the chief points in a former section, have also had some influence on the views held, from time to time, as to the systematic position of the achorion, and the question remains unsettled at the present time.

We may, here, just repeat, shortly, that there are two ways, direct and indirect, in which attempts have been made to determine the position of the achorion in a system of natural history. Directly, by the cultivation of the fungus; by which it was attempted, under proper precautions (isolating apparatus, culture apparatus of various sorts) with various nutrient media (water, solution of sugar, white of egg, &c.), to develop the fungus into a higher vegetative condition, in the hope that under these circumstances it would throw out organs of fructification characteristic of its genus.

Amongst those who have arrived at positive results by cultivation, Lowe obtained *Aspergillus* from favus, Hallier and Baumgarten (also Pick in uncultivated favus of the mouse) *Penicillium*, and Hoffmann *Mucor*. I have already shown, in detail, that these and analogous cultivation experiments cannot in any way aid in determining the botanical relationships of the achorion. For, in the first place, most of the observers, in addition to the special fungus stated, also saw others develop in the object of culture, and therefore, all are to be regarded as products of contamination; and, further, because the forms mentioned, according to our present

[1] See the illustration of "Puccinia favi," given by Robin, l. c., 'Atlas,' pl. xiv, fig. 13.

[2] 'Müller's Archiv,' 1842, p. 200.

[3] Robin, l. c., p. 477.

state of knowledge of mycology, do not represent special forms of fructification of fungi.

Indirectly, the end in view in regard to the favus fungus was pursued simultaneously with that in regard to the fungus of tinea tousurans, for, in the first place, favus was inoculated, and, secondly, it was hoped that favus might be produced by the application of mould fungus or the scales of tinea tonsurans.

Remak, in the year 1842, was the first to undertake the direct inoculation of favus. He fastened some favus crust on the dorsum of his left forearm by means of sticking plaster. After three or four days, the crust fell off without leaving any trace behind. At the end of fourteen days, a red spot made its appearance, attended by itching and desquamation of the epidermis. In its centre, a pustule developed, and then dried up into a crust, and after this, there was a favus scutulum to be seen, which was demonstrated to consist of fungus elements.

Since the time of Remak, inoculations of favus have been attempted, but not always successfully, by Bennett, Vogel, Deffis, and Bazin, Fuchs, Gudden, Hebra, Köbner, Pick, Peyritsch, &c. Those of Köbner,[2] Pick,[3] and Peyritsch,[4] which were attended by positive results, are also those which are best described, and these experimenters have also pointed out the most suitable method for the inoculation (maceration of the epidermis or puncture of it near the aperture of a follicle. Gudden once raised the epidermis by the previous application of a blister, and thus obtained success).

(Inoculations of favus have also been carried out in the lower animals; by Köbner and Peyritsch in rabbits, by St. Cyr in cats).

In these artificial inoculations, as a rule, after a few days, red points and papules make their appearance and steadily develop into red, desquamating circles, or into vesicular rings, and imitate the well-known formations met with in ringworm. Either in the centre of such circles, or on peripheral parts of the red discs or circles, a favus mass becomes developed, here and there, in the course of two or three weeks; or, oftener, however, only in five or six weeks, after the red patches or circles have possibly already dis-

[1] 'Med. Vereinszeitung,' 1842, No. 31.
[2] 'Exp. Mittheilungen,' l. c.
[3] 'Unters. über die pflanzlichen Hautparasiten,' l. c.
[4] 'Beitrag zur Kenntniss des Favus,' l. c.

appeared, whilst most of the patches and circles pale and disappear after a few days or weeks.

These herpes (tinea) forms, as already mentioned, have also been observed by Hebra, myself, and others, to arise spontaneously, and we have also traced their progress in the inoculation experiments of Peyritsch. The epidermis over them also contains fungus, as I showed in the year 1871.

The forms named are considered identical with those of ringworm by some authors, Hebra, Pick, &c. Köbner calls them a "herpetic antecedent stage" of favus, and considers that he has demonstrated them to be different from ringworm.

The second indirect plan of arriving at a conclusion in regard to the nature of favus, by studying the influence of mould fungi on the skin, experimentally, has not led to any result. Whilst all corresponding attempts of various experimenters had been wholly without effect, Pick succeeded, by the inoculation of *Penicillium*, in giving rise to circles resembling ringworm, and which he regards as the "abortive stage" of favus, though he never found favus scutula, but only microscopic fungus elements "united in small heaps," in the neighbourhood of a hair coming from its follicle.[1]

That Zürn[2] also produced an eruption, in rabbits, by the inoculation of *Penicillium*, which was said to be indistinguishable from favus, has been already noticed.

Neither the one nor the other is undoubtedly favus.

Occurrence of Favus.

Favus is met with almost exclusively in young subjects, from early childhood to the age of twenty or thirty. In the latter cases, however, the disease has persisted, as a rule, from early life. According to our own observation, favus is commoner in male subjects.

These statements apply to cases in which favus would seem to be acquired by direct transmission.

Those much rarer favus affections, however, which we have observed to develop under the influence of moist mouldy compresses, or under conditions which we cannot precisely define, in an acute manner, and always associated with the production of

[1] Pick, l. c., p. 14.
[2] Hallier, 'Virch. Arch.,' 1868.

ringworm-like forms, have occurred, not only in young subjects, but also in those advanced in life.

On the whole, favus is rather rare, here, and, when it is met with, has generally been imported from foreign sources. This is the more remarkable, because France appears to be extraordinarily rich in favus patients, both according to old (Mahon) and, also, modern (Bazin) reports.[1]

In the clinic and department of the General Hospital at Vienna, during the ten years from 1865—1874, among 25,935 cases of skin disease, we have counted 48 males and 8 females=56 persons, affected with favus, that is, in the proportion of somewhat over 2 cases per thousand, of other cases of skin disease, and with a maximum of 12 cases, during the year 1866, and a minimum of one case, in 1871, and not a single case, in 1872.

By far the majority of the cases of favus met with, here, come from Austrian and Russian Poland.

Etiology.

Though, since the fungus nature of the constituent elements of favus has been established, and, especially, from the numerous instances of undoubted transference of favus (either accidentally or purposely, from one individual to another, from the lower animals to man, and *vice versa*) there can be no doubt that favus is caused, solely, by the fungus met with in connection with it, yet, we know scarcely anything of the special origin of this fungus, in its mycological systematic relations, or even in an ordinary sense. An explanation of this etiological influence would be of great practical value, for we should then, more probably, be in a position to prevent the disease.

At present, we can only say that, whether the favus fungus may prove, ultimately, to be mycologically of a specific character, or a form of vegetation of a common mould, it flourishes under conditions similar to those favorable to the mould fungi in general, and attaches itself to the human skin in a similar manner. Therefore, favus occurs principally in individuals who are personally careless of

[1] From a communication made by Dr. Bergeron to the Paris Academy of Medicine, on Jan. 19, 1864, and quoted by Kleinhans, l. c., p. 85, it is to be inferred, "that no department of France is quite free from tinea," and that tinea favosa is far more commonly met with, than tinea tonsurans. In the south, round about Hérault, there are twenty cases of tinea among every 1000 individuals.

cleanliness, or whose surroundings are wanting in cleanliness, among the children of poor families whose dwellings and general surroundings are neglected. We cannot recollect to have ever seen a single case of what may be called idiopathic favus, among the better classes of society.

Most frequently, undoubtedly, favus is produced by transference from one individual to another. This can often be demonstrated, but, in many cases, especially where the disease has lasted for years, a history of contagion cannot be obtained.

It must not be overlooked that favus can be communicated from the lower animals to man. It has been shown that favus occurs in mice, rabbits, dogs, fowls, and cats, and has been contagious from these to man; to some extent, also, favus has been purposely inoculated from man on the lower animals mentioned.[1]

It has been asserted that in the lower animals, favus causes more severe symptoms than in man. In mice, deep ulcers (Bazin) may be produced, or destruction of cartilage and bone (Simon), and the animals are said to suffer considerably in their general health, and even to die (Anderson). On the other hand, St. Cyr, who has performed a number of inoculation experiments on the lower animals, states that those affected with favus remain perfectly well.

In addition to its being transmitted from man to man, or from the lower animals, we must also admit that favus may arise in an independent manner, inasmuch as the favus fungus may be carried by the air, or may adhere to some implement, and, under favorable conditions, may be implanted in the epidermis, and proliferate and develop. It is in this way we must explain those cases in which we observed favus spring up, during the use of moist applications, in individuals, and under circumstances, where it was quite impossible that direct transference from a patient affected with favus could have occurred; or where, as in a case under observation quite lately, ringworm-like patches, with favus scutula, made their appearance

[1] "Favus in Mice:" see Bennett, 'Month. Journ. Med. Science,' 1850, vol. xi, p. 48; Friedreich, 'Virch. Arch.,' xiii B., p. 287; Zander, ibid, xiv B., p. 569; Schrader, ibid, xv B., p. 382; Pick (Frauenfeld), l. c.; Th. Simon, 'Arch. f. Derm. und Syph.,' 1870, p. 544, u. ibid, 1872, p. 404; Bazin, l. c., 1858, p. 119; Anderson, l. c., p. 165. "Favus in Cats:" see Bazin, l. c., Anderson, l. c.; St. Cyr, 'Annales de Dermatol. et de la Syph.,' 1869, 4. "Favus in Dogs:" see Anderson, l. c., p. 165; St. Cyr, l. c. "Favus in Cochin China Fowls:" Müller u. Gerlach, in Köbner, l. c., p. 119. "Favus in Rabbits," Köbner, l. c.

quite acutely, within ten or twelve days, on the back of a man, 40 years of age, who was living under good hygienic conditions, and where no poultices or other applications of any sort had been used.

As a rule, however, the contagiousness of favus is not by any means so marked as that of many other contagious diseases, and especially that of ringworm, to be described in the next chapter. In support of this statement, we have the fact of the great rarity of the disease, at least in this country (Vienna), and its being met with in isolated cases only, as a rule. We have never seen favus, here, spread through a family, schools, hospitals, or barracks, among persons crowded together and necessarily brought into close intercourse with one another, even though a case had insinuated itself amongst them, nor, where one case has existed for years (as in one member of a family) have we seen other members attacked; at the most, we have only seen an isolated case or so. This is the more remarkable as the favus fungus occurs in great abundance on the head, or on the body of the patient, and lies, partly, quite exposed on the surface of the body, and, therefore, might quite easily in all sorts of ways be transferred to other individuals.

We might, for this reason, be disposed to consider that some special predisposition on the part of the individual, or, at least, of his skin, was necessary before any one could become affected; and this, indeed, has been asserted in many quarters. In particular, scrofula and its associates (caries, enlargement of glands) and syphilis (Bazin) have been cited as predisposing causes.

We have already laid it down that such conditions as those just mentioned can only come into play as favouring the outbreak of the disease, just as a want of cleanly habits will also do, for a state of "quiescence" seems absolutely necessary for the development of the fungus germs when once implanted.

I do not believe that the question of any true special disposition for the disease can be seriously entertained, for the experimental inoculations of favus have shown that it may be developed in any skin, whatever, provided proper measures are adopted.

The cause of the rarity of accidental inoculation of favus appears to me to lie in the special vegetative conditions of this fungus; or, if we prefer to say so, of this fungus morphosis, for, as regards the achorion, they appear more difficult of fulfilment than, for instance, those of the fungus of ringworm. As the experimental inoculations

have taught us, the achorion gonidia are implanted with greater certainty in the funnel-shaped space of the hair follicle; and when they become located here, accidentally, also, they thrive most vigorously and develop an agglomeration of scutula. It would seem, therefore, that the achorion requires space, in the first place, and, secondly, very long-continued quietude; that is, a protected situation, and the latter need arises from the fact of its development being very slow; in experimental inoculations, it occupied at least three to six weeks. These complicated contingencies are associated but seldom under ordinary conditions of human life, as the friction of the clothes, the use of the comb, &c., would be sufficient to disturb or remove the germs which had accidentally lodged on exposed parts.

This may also explain why, as a rule, favus travels from one spot to another on the same individual, with such difficulty and slowness, and remains located to one region, the scalp, for instance, for months and years—facts contrasting strongly with what occurs in ringworm, which is apparently so closely related to favus.

Diagnosis.

Favus of the scalp, with desseminated scutula, or with even a single well-developed honeycomb, possesses such strong characteristics, that it can scarcely be mistaken. Even when the favus masses have accumulated into thick heaps of sulphur-yellow colour, and no isolated scutula are visible, the diagnosis can hardly become doubtful.

On the other hand, old favus accumulations of moderate degree of development will have lost their yellow colour, and have become dirty grey-white, in colour, and mortar-like, in appearance, and present a decided resemblance to the accumulations of epidermis, caused by psoriasis. In the latter, also, not unfrequently, there is considerable loss of hair, or many hairs can be removed by the slightest traction. This makes the similarity with favus suberinus still greater. On the other hand, in psoriasis, the firm hairs in the region affected by the accumulation, never have the dull, lustreless appearance they have in favus.

It is scarcely necessary to mention, that a microscopic examination of the accumulated masses would at once reveal their fungoid character.

If, however, we have to deal with a case in which the favus

crusts have been removed some few days previously, or, where, as in cases of old standing, they have spontaneously fallen off, the diagnosis is not always so easy, or it may be, that, for the time, it is impossible to be sure without the aid of a microscopic examination.

In such cases, the scalp over its whole extent, or at separate foci, appears moderately reddened, and covered with white, dirty-white, thin, dry, opaque, or laminated scales. According to circumstances, the appearances may resemble those of eczema squamosum, or seborrhœa capillitii, or psoriasis—obviously not mycotic processes—or a mycosis, ringworm.

The circular outline of the patches, especially marked in the neighbourhood of the margin of the hair, will at once contra-indicate the diagnosis of eczema or seborrhœa, as, in the latter diseases, the redness and scaliness, as a rule, appear to be diffused over the whole of the scalp. Psoriasis, on the other hand, presents circular outlines, such as those met with in favus.

But, in contrast to psoriasis, a sufficiently evident means of diagnosis will be found in the peculiar state of the hair always met with on the area affected by the disease, and, also, not unfrequently, in the localised alopecia, with cicatricial appearance.

The latter symptom will also aid in diagnosing favus in this stage from ringworm, for though, isolated patches of baldness may be met with in the latter disease, cicatricial degeneration of the skin is wanting.

A microscopic examination of the epidermic scales, described, and, especially, also, of the hairs, will obviously be most efficacious in removing doubt at once. A negative result, that is, the non-detection of fungus, does not of itself warrant any positive conclusion as to the absence of mycosis. To justify this, it is necessary that a number of places be often examined, and the greatest skill must be exercised in the choice of hairs and scales for examination.

On the other hand, if mycelium is detected, it is obvious that any affection other than a mycosis can be excluded. But whether the discovery of the fungus elements indicates the presence of favus, or of ringworm, is much more difficult to determine mycologically, or hardly possible, for the elements of the two resemble each other.

Here, the clinical symptoms previously mentioned, the peculiar appearance of the hairs, and the cicatricial degeneration of the bald

places, are valuable for diagnosis. If, however, these fail, then, time will settle the question. If we have to deal with favus, then, if the scalp be left without any treatment, that is, remains wholly at rest, within two or three weeks, undoubted favus scutula will appear here and there, within the area affected with scaliness. If the case is one of ringworm, the desquamation persists, fresh, red, scaly circles and discs, covered with hairs broken off close to the surface, will develop, but no scutula will form. The same aids will serve for diagnosis if we have favus associated with ringworm forms.

Prognosis.

After what we have said, in the general introduction, as to the essential character of the dermatomycoses, we need not here explain further that, according to our present views of favus, no other consequences of any sort need be feared to result from it, than those purely local and superficial ones which have been described. Neither the deeply-situated structures, nor the general organism will be in any way influenced, even after favus has lasted for many years.

The prognosis is always, however, so far unfavorable, that it hardly dies out spontaneously when the scalp is affected, and, mostly, not till after the lapse of many years, and the hair follicles over large tracts have been destroyed. That favus should then stop, where the hair follicles have been quite destroyed, is easily comprehended, as it only flourishes well in the epidermic linings of the hair follicles, and by the destruction of the latter, the soil in which it grows is removed. But, how it is brought about that favus, finally, completely dies out and disappears without affecting the whole of the scalp, cannot be discovered, and, at most, can only be explained by the slowness with which the achorion in a general way spreads to new tracts.

Also, as regards the treatment of favus, the prognosis is so far unfavorable that it must always extend over many months, and that the criteria of the total arrest of the disease are very indefinite. Yet, any case of favus, under any circumstances admits of cure.

Favus of parts which are not hairy, generally progresses satisfactorily, for, as a rule, it spontaneously subsides after lasting but a short time. It is very rarely that it persists for months or years. Even in such cases, however, it can easily be cured in a very short time.

Treatment.

Long before we had any exact knowledge as to the precise character of favus, certain of the laity and physicians were aware of the proper method of dealing with this obstinate malady. This, in fact, was discovered as soon as it was realised that the mere removal of the accumulated masses did not suffice for a cure, but that the hair must at the same time be removed, that is, extracted from the scalp.

This had resulted, either from observing that favus never again developed on parts which had been completely deprived of hair by the morbid process, or, because fresh outbreaks had been noticed to occur, invariably, around hairs. At any rate, it is certain that from a very remote period, the plan of extracting, or "tearing out" the hair has been practised in the treatment of favus, and, at the present time (when we are certainly better aware of the reasons which necessitate this process), we still use the same plan, though in a more suitable and careful manner.

Until comparatively lately, it was the universal custom to employ the so-called "pitch-cap" (la callotte). A highly adhesive mass was prepared by mixing pitch, vinegar, and flour. This was spread on a cotton or linen cap, and the latter applied to the scalp and fixed on firmly. Then a practised assistant would seize the cap with both hands in front, and, whilst the patient was firmly held, would tear it off from before backwards with a skilful and powerful jerk. The hairs sticking to the plaster would be forcibly removed by the roots by this plan. After various kinds of soaps, lotions, and salves had been rubbed in, a second, or even a third application of the pitch-cap would be made, at intervals of a few days or weeks, until the greater part of the hair, or all of it had been removed.

It is evident that this procedure was a very rough one, barbaric, and exceedingly painful to the patient. For, the greater part of the hairs were not pulled out in the direction of their axes, and healthy hairs were extracted with the diseased ones indiscriminately, and the end aimed at, total epilation, was nevertheless not obtained.

The merit, therefore, of the brothers Mahon cannot be sufficiently insisted on, for, at a time when the fungus nature of favus, and the relationship of the exciter of the disease, to the hairs and the ha

root-sheaths, were not suspected in the remotest degree, they put an end to this horrible plan of the application of the calotte. The brothers Mahon obtained the privilege of treating all the patients affected with "tinea" in the hospitals of Paris, Lyons, Rouen, Dieppe, Elbœuf, and Louvriers, and thereby obtained an opportunity of studying the nature and course of favus, and the suitability of the various methods of treatment. Their experience in regard to "tinea," and especially favus and its treatment, after the lapse of a quarter of a century from the time they began to devote attention to the "teignes," is recorded in a work published in the year 1829.[1] That this privilege, and the material advantages accruing to them from it, excited much jealousy was naturally to be expected, and was not diminished by their knowing how to conceal their curative procedure under a host of phrases, and their keeping it a close family secret.[2]

The most essential improvement in their method consisted, as has been mentioned, in the fact, that they gave up the use of the pitch-cap. That their secret salves and powders, alone, did not suffice for cure, and that they, as well as all subsequent sensible physicians, actually employed the epilation denounced by them, is certain, but, they appeared to practise it as an accessory only. They used their fingers, or even forceps, as previously recommended by Plumbe.

Since we have come to recognise the true cause of favus in the *Achorion Schönleinii*, and have become acquainted with the manner of the diffusion of the fungus within the hair follicle, and with the topographical relationships of the disease, we have obtained thoroughly rational grounds for the treatment of favus. The first and only conditions for the cure, are, checking the propagation of the favus fungus, killing it, and removing it from its concealed site within the hair follicles. It is also evident, at once, that the happy effect of the methods of epilation hitherto in use had depended, unsuspected, on the mechanical removal of the fungus, growing in the hair and in the layers of the root-sheaths.

[1] 'Recherches sur le Siège et la Nature des Teignes,' par M. Mahon jeune, Paris, 1829.

[2] Mahon, l. c., p. 371, flatters himself he excuses this silence on his part, with various sophisms and characteristic phrases: "Mais le silence est pour nous une obligation dont nous ne pouvons nous délier seul; des stipulations inviolables, des devoirs sacrés de famille, nous opposent un obstacle invincible et renferment toute notre excuse."

Both these indications, the killing the fungus, and its mechanical removal, have been sought to be attained in various ways.

In the first place, we have to deal with the favus masses lying superficially on the skin, whether, as in the young scutula, they appear to be covered everywhere with epidermis, and enveloped by it, or, as in the older favus masses, are quite exposed.

Amongst all the proposals of various sorts which have been made for the softening and mechanical removal of these favus masses, such as poultices of mashed potatoes, cataplasmata of various herbs, pastes of varied composition, there is not one at all necessary in my opinion. We attain this end by the same simple means, and in just as short a time, as the softening and removal of the scales and crusts accumulated on the scalp, in eczema or psoriasis, that is, by the energetic and copious application of oil, followed by washing with soap.

We use olive oil, or cod oil, with, or without balsam of Peru or carbolic acid, and without any preference for one more than another. What is essential is, solely, fat in a fluid state, and that it should be used in such quantity, and rubbed in so energetically, that the favus masses shall become soft and rotten in a few hours. The oil selected is, therefore, rubbed in by means of an ordinary brush or a coarse painter's brush, and also poured over the masses, so that it may quickly soak in, and the scalp is then covered with a flannel hood. After two or three hours, the oiling is renewed. In the course of twelve to twenty-four hours, the thickest favus masses become softened. They are then removed with the fingers or a tongue spatula. Then the head is well washed with soap, or spirit of potash-soap, and water, the favus fragments still remaining, being removed in this way, and the scalp thoroughly cleansed.

We obtain this result within twenty-four hours, without—and this is not unimportant in females—even cutting the hair short.

This preliminary cleansing of the scalp is only the first and less important stage in the treatment of favus. Now begins the second, which is much more difficult and tedious.

It concerns the removal of the favus masses, together with the tissues infiltrated by them—the hairs and hair root-sheaths—from the hair follicles. There are still plenty of fungus elements remaining in the follicles deprived of hairs, for the root-sheaths can never be entirely removed with the hairs, and a fresh outgrowth would take place. And for this very reason, epilation becomes indispensably

necessary, because it is only by this means, that the remedies which are to destroy the fungus, and which are used subsequently, can reach the follicles, and act on the fungus elements left behind.

Finally, at the same time that the hair-follicles are freed from their parasitic contents, the pressure on the hair papillæ is removed, and it becomes possible for a new hair to be developed after the complete destruction of the favus germs.

After, as has been mentioned, the use of the pitch-cap had been almost wholly given up,[1] the necessity for the removal of the diseased hairs was still, however, manifest to most physicians; it was recommended by many to attain this end indirectly. By rubbing into the scalp irritating substances, such as croton oil, turpentine oil (Gudden), creasote, ethereal oils of various sorts, it was sought to set up an acute inflammatory or suppurative process. It was hoped that the hair root-sheaths and the hairs would be loosened by the exudation into the follicles which would result, and that they would thus be predisposed to shed. These measures are wholly ineffectual. The inflammation and suppuration, so excited, are always quite irregular, affect many healthy, and avoid many diseased follicles, do not bring about the expected expulsion of the hairs, are attended by great pain, and, sometimes, by dangerous results, fever, erysipelas, &c., and this plan neither supersedes other treatment, subsequently necessary, nor cuts short the duration of the treatment, nor, lastly, does it afford any more certainty of success, than other more simple procedures.

Direct epilation is alone to be trusted and certain of success.

It is effected by some practitioners by means of forceps. Bazin lays great stress on the method of epilation. Among his patients, epilation is effected by specially trained assistants, who use the forceps introduced by Deffis (they have broad, firm, bluntly grooved, long branches), at several successive "sittings," travelling over the whole of the affected area; that is, each hair is removed.

The method is undoubtedly rational. It is, however, unnecessarily painful. For the healthy hairs, without any distinction, are also extracted. In females, the hair must be cut short to allow of epilation, which involves an annoying disfigurement. More-

[1] It is still used in many districts in Poland—often as a "secret remedy"—by the common people, and especially by certain women who make a living out of the treatment of favus.

over, in many cases, the epilation must be repeated after three or six weeks. Parasiticides must be used in the intervals and persistently subsequently. And, lastly, we gather that this plan of treatment is not quicker, nor is the period at which a cure will ensue more certain, nor is the cure more capable of proof, than in our own procedures, which are much more simple, and not at all painful.

We epilate, in favus, by holding the hairs indiscriminately, and in thin tufts, between a blunt-edged instrument, a tongue spatula, for instance, and the opposed thumb, and then drawing them out. By this slight traction, which is borne even by little children without complaint, the diseased and, therefore, loose hairs are extracted, whilst the healthy hairs remain in the follicles. It is obvious that we cannot in this way remove all the diseased hairs within a few days. This is impossible, however, by any plan, because during the treatment many hairs become affected, as fungus is present in their follicles. But, on the one hand, this gradual epilation has not the slightest ill-effect on the duration or the success of the treatment, and, on the other hand, possesses very great advantages—painlessness and preservation of the healthy hairs; it renders cutting and shaving the hair unnecessary, and can conveniently be carried out in part by attendants, whilst the physician only takes any share in epilation from time to time.

In addition to the methods of procedure mentioned, which act mechanically, only, it is necessary, also, to brush in parasiticides most industriously, in order to destroy the remaining fungus germs located in the follicles. As such, may be recommended—oil of tar; tar diluted with alcohol or ether (Tinctura Rusci, Hebra); alcohol, alone, or combined with carbolic acid, salicylic acid, benzine, or creasote; or the latter substances mixed with oil; balsam of Peru; petroleum; petroleum-ether; chloroform; lac sulphuris mixed with spiritus saponis; corrosive sublimate dissolved in alcohol or water (0·5 in 100); ethereal oils, such as ol. caryophyllorum, macis, menthæ, &c., mixed in small quantities with oil or alcohol; and a great number of analogous remedies recognised as parasiticides.

We have no reason for preferring any of these remedies to the others. With any of them, we can attain the desired end, for success depends above all on methodical and persistent use.

Briefly, our method of treating favus is as follows:—

The favus masses are softened by the energetic application of oil,

and then removed, at the end of twelve or twenty-four hours, any remains being washed off with soap; then the hairs are seized between the thumb and a tongue spatula and pulled, many diseased hairs being thus brought away. When the epilation is finished, any one of the fluids above mentioned is brushed in.

These three procedures are repeated daily—washing the scalp by means of spirit of soap, epilation, brushing in a parasiticide.

The latter will be chosen according to the state of the scalp. If this is dry, red, desquamating, and fissured, oily remedies or salves, with creasote, white precipitate, &c., should be used; when itching is present, tar should be applied and, so forth, according to circumstances.

This plan should be continued in a case of diffused favus of the scalp for two or three months uninterruptedly. If for some three or four weeks, the scalp, previously congested, has been quite pale, the epidermis smooth, but slightly scaly, and if, on epilation, but few hairs can be removed, or none at all, and those remaining are firmly fixed and of normal appearance, the treatment may be interrupted, but the patient must not by any means be regarded as cured.

Now a period of observation of four or six weeks must be allowed to elapse. If favus has remained in one follicle or another, a scutulum will develop within that period at the seat of the remaining fungus. Such fresh outbreaks, confined to limited areas, must then be attacked energetically; all the hairs involved must be extracted with forceps, and the parasiticide must be rubbed into these parts, thrice daily, vigorously.

It is only when, after a supposed cure, the treatment—even the mere washing of the scalp—has been wholly discontinued, and, for some six or eight weeks, no fresh scutulum, no marked scaliness, and no loosening and degeneration of the hairs, have shown themselves, that the patient may be declared to be wholly cured.

The necessity of watching for two months, the possibility of one or two slight returns, and the duration of the first period of treatment, taken together, give an average duration of five or six months for the treatment of a diffused favus of the scalp, and, therefore, the patient or his friends should be made acquainted with this from the commencement.

It is obvious that we can treat a case of favus where the disease is confined to a small patch in much shorter time, because, in such

a case, each individual hair and each follicle in the affected area can be inspected daily.

Favus on the body is very quickly cured, as we have, practically, simply to soften and mechanically remove the favus masses lying on the surface. A single or twofold inunction of soft soap or cod oil will soften the epidermic layers covering the honeycombs, and the favus masses themselves. A warm bath and a thorough wash with soap will suffice for the complete removal of favus, on parts without hair.

As the follicles of the lanugo hairs are very shallow, the parasiticide can easily gain access, and epilation is not necessary. It is quite sufficient, if the patient regularly applies any of the parasiticides mentioned, either fluids or salves, carbolic oil, carbolic ointment, &c., and frequently washes with soap, and employs friction, in order to prevent any fresh formation of favus matter.

Favus of the nails can only be quickly cured by the removal of the affected nails. Filing the nails and the subsequent application of solutions of corrosive sublimate, carbolic acid, and the like, are only attended by a precarious success.[1]

Occasionally, favus of the nail perishes spontaneously, and is gradually pushed forward by the healthy portion of nail subsequently formed. It then becomes gradually worn away from the front, or may be cut off bit by bit.

[1] Dr. Hilton Fagge, in a paper in the 'Clinical Society's Trans.' (vol. i, p. 77, "Cases of Parasitic Disease of the Nails, associated with different Parasitic Affections of the Scalp and Body"), reports very strongly in favour of the plan of soaking the nails constantly in a solution of hyposulphite of soda (℥j—℥ij, ad ℥j aquæ). Lint, dipped in the solution, is kept applied and covered with gutta percha. The solution soaks well into the nail substance, and quickly destroys the fungus, without any paring or removal of the nail being necessary. In the case of a girl under my own care at the London Hospital, several nails were affected with copious parasitic growth, caught from the head of a boy affected with favus. Constant soaking with the solution removed all trace of fungus in a short time, and the cure remained permanent while the girl was under observation after the treatment had been discontinued. In young children, and in other cases in which such treatment would be imperfectly carried out, one need not hesitate to remove the nails.—(Tr.)

RINGWORM.

(*Tinea tonsurans, Herpes tonsurans, die scheerende Flechte; also, Herpes circinatus, Tinea circinata.*)

History.

The history of the skin disease called ringworm, which is caused by a vegetable parasite, the *Trichophyton tonsurans*, Malmsten, is much more complicated than that of favus, and in many of its relations, is not yet complete. This depends, in great measure, on the great variety of forms it presents to our observation. For this reason it may easily happen, that certain varieties of form of the disease may appear to be special forms of disease, and may, therefore, have special names given them; and, further, that mistakes of diagnosis from other maladies may arise all the more frequently. This also accounts for the fact that in the history of ringworm, we encounter such a great number of designations for one and the same affection, as is hardly met with in any other disease—porrigo scutulata, Willan; herpes tonsurans, herpes squamosus, Cazenave; herpes circinatus, Bateman; porrigo tonsoria, dartre furfuracée arrondie, Alibert; tinea tondens, squarus tondens, Mahon; teigne tondante of many French authors; teigne annulaire, Rayer; lichen herpetiformis, Devergie; lichen circumscriptus, figuratus, gyratus, herpetiformis, impetigo figurata, &c., of various authors; ringworm, common ringworm of the English; phyto-alopecia, Malmsten; rhizophyto-alopecia, trichophytie, Gruby; mycosis, dermatomycosis tonsurans, Köbner; tinea trichophytina and tinea circinata, Anderson, &c.

It would not help us in the least to comprehend the affection under discussion, if we were to refer back to the conceptions associated by the older authors with the designations herpes, serpigo, and their subdivisions.

The first description which concerns us, though it refers only to one form of this malady, occurs in Willan, who represents the affection under the designation porrigo scutulata, in pl. 29 of his work.[1] Willan says the disease is hard to cure and very contagious. The

[1] 'Delineations of Cutaneous Diseases,' &c., &c., London, 1817.

plate represents a characteristic case of ringworm of the scalp, and shows disseminated patches covered with short (broken) hairs and scales, and also a red circular patch on the forehead.

A much more thorough knowledge of the course and great varieties of form of this disease was evinced by Plumbe[1], for he stated that it took quite a different form on the scalp, to what it did on parts which were not hairy, and that in the latter positions, it quite coincided with the herpes circinatus of Bateman; also, that by inoculating the crusts of prurigo scutulata, found on the scalp, on other parts of the skin, the circles characteristic of ringworm could be produced there, and conversely, from these, porrigo scutulata could be produced on the scalp.

In the year 1829, Mahon again drew attention to this disease, which he figured in his work, in Taf. iii, fig. 1, in conformity with the porrigo scutulata of Willan, and described it rightly under the name teigne tondante.[2]

Nevertheless, the affection, generally speaking, was not much better understood. It was confused with various other diseases of the scalp, such as alopecia areata (porrigo decalvans, Willan), favus, seborrhœa, eczema, herpes in general, and affections of other kinds, as may be gathered from the contemporary, and even later works of Alibert, Biett, J. Green, Gibert, Riecke, Fuchs, Er. Wilson, &c.

A fresh objective contribution to the pathology of the disease in question was afforded by Cazenave, who, in the year 1840, observed an affection of the scalp attended by loss of hair, and manifestly spreading from one individual to another, in sixteen boys belonging to a school. At various parts of the scalp, vesicles appeared, which soon dried up, leaving scales behind, whilst at the periphery, fresh vesicles appeared, and in this way, the patch spread peripherally. The hair over the part affected appeared broken short off. On this account, and owing to the vesicular character of the eruption observed, Cazenave designated the disease herpes tonsurans.[3]

Cazenave, thus, at once, not only set aside the designation teigne tondante suggested by Mahon, and already fairly well es-

[1] Plumbe, 'A Practical Essay on Ringworm of the Scalp,' London, 1821; and a 'Practical Treatise on Diseases of the Skin,' 4th edition, London, 1837.

[2] Mahon, l. c., p. 134.

[3] Cazenave, 'Leçons sur les Maladies de la Peau,' Paris, 1845, p. 46; 'Annales des Maladies de la Peau et de la Syphilis,' vol. i, p. 42; and 'Traité des Maladies du Cuir Chevelu,' Paris, 1850.

tablished, but, also, fixed the vesicular eruption as the fundamental form of the process, whilst both the porrigo scutulata of Willan, and the tinea tondens of Mahon, only referred to a squamous form of tinea, and its localisation on the scalp.

According to Cazenave's idea, herpes tonsurans represented a new form of herpes which was often associated with herpes circinatus, and, indeed, might be developed from it, if the herpes circinatus became located on the scalp. Essentially, however, there was nothing original in this, for Plumbe had already identified the herpes circinatus of Bateman with porrigo scutulata.

An insight into the essential nature of this peculiar disease was obtained, first of all, when Gruby,[1] in Paris, and Malmsten, in Stockholm, almost simultaneously made the discovery, that a fungus was present in the hairs so breaking off, and in their root-sheaths. This fungus was called trichophyton tonsurans by Malmsten.[2] The disease caused by it, he named trichomyces tonsurans, whilst Gruby called it rhizophyto-alopecia.

According to Malmsten, the vegetation of the fungus within the hair substance constitutes the primary and essential feature of the disease, and there ought not to be "a trace of the formation of fungus between the epidermic cells" to be discovered. The latter erroneous statement is also found in Küchenmeister,[3] ten years subsequently.

The significance of this newly found fungus, in regard to porrigo scutulata or tinea tonsurans, was generally acknowledged, and the more so, as a well-established analogue existed in the relationship between the achorion and favus. Those only who disputed the etiological importance of the fungi attributed to favus and the mycoses in general, in reference to these diseases, such as Er. Wilson,[4] Cazenave,[5] Fuchs,[6] and some others, were at all in doubt as regards tinea tondens and the trichophyton.

[1] "Recherches sur les Cryptogames qui constituent la Maladie contagieuse du Cuir Chevelu décrite sous le nom de teigne tondante' (Mahon); Herpès tonsurant (Cazenave)," 'Comptes rendus des Séances de l'Acad. Royale des Sciences de Paris,' 1844, tome xviii, p. 583.

[2] 'Trichophyton tonsurans, Harskärande Mögel, Bidrag till utredande af de sjukdomar, som vallahartes affal,' Stockholm, 1845.

[3] L. c., 2 Th., p. 31.

[4] Er. Wilson, 'On Ringworm: its Causes, Pathology, and Treatment,' London, 1847.

[5] Cazenave, 'Traité des Maladies du Cuir Chevelu, Paris, 1850.

[6] Fuchs, l. c.

The number of authors who have since devoted their attention to tinea tonsurans, and have sought to advance our knowledge of this disease, in its pathological and mycological relations, is very considerable; among them, are Hebra,[1] Robin,[2] Lebert,[3] Bärenspung,[4] Wedl,[5] Küchenmeister, Fox, Anderson, Köbner, Strube, Kaposi, Pick, Hallier, and many others. It is clear from the very nature of the thing, that the literature of tinea tonsurans must coincide, in great part, with that of favus, and has, therefore, been already quoted in the chapter on that subject. A general account of the works on ringworm appears less necessary, here, because authors seem tolerably agreed, on the whole, as to essentials. The points, however, in which there are still differences of opinion are of such different character, that they can only be dealt with by a special consideration of the process in question. For they relate, partly, to the mycological status of the trichophyton, partly, to the relationship of this to the achorion, and of tinea tonsurans to favus, and, partly, to the much disputed relationship of herpes circinatus, eczema marginatum, sycosis parasitaria, and even alopecia areata, to ringworm.

In regard to the symptomatology, more especially, Hebra, as early as 1854, sketched most characteristically the various forms in which the disease may make its appearance, according as to whether it is situated on the scalp, or on parts not covered with hair. According to Hebra's description, tinea tonsurans of the scalp answers completely to the accounts given by earlier authors of tinea tondens or porrigo scutulata. On parts not covered by hair, Hebra describes the disease as occurring in two forms, the vesicular and the macular.

The vesicular form clearly agrees with that spoken of by Cazenave and many other authors as herpes circinatus.

As, however, Hebra and his school, as is well known, use the term herpes circinatus[6]—and quite rightly—as applied to a developmental form of herpes iris, that is, erythema iris and circinatum, which has nothing in common with tinea tonsurans, or the mycoses in general, and which, moreover, is characterised by its special localisation (back

[1] Hebra, 'Zeitsch. der k. k. Ges. d. Ærzte in Wien.,' x. Jahrgang, 1854.
[2] Robin, l. c., p. 408.
[3] Lebert, bei Robin, l. c.
[4] Bärensprung, 'Annalen der Charité,' 1855, 6 Jahrg., 2 Heft.
[5] Wedl, l. c., p. 746.
[6] See vol. i, p. 378.

of the hand and of the foot), typus annuus, and typical and acute course, we find the term herpes circinatus used in a twofold sense; as indicating a vesicular form of tinea tonsurans, and, also, an affection which is not a mycosis (Hebra and his school).

This unfortunate confusion is all the more difficult of removal, because the etiology of herpes circinatus (erythema circinatum) is, up to the present time, unexplained; because the vesicular circles of tinea tonsurans cannot be distinguished from those of herpes circinatus, apart from looking at the process as a whole, and, lastly, because, in our present state of utter ignorance of the causes of herpes circinatus, it is quite impossible to say whether, in certain cases of typical herpes circinatus, a parasitic fungus may not act as a cause. For, I have detected heaps of spores, with the microscope, in the coverings of the vesicles, in a typical case of herpes circinatus (on the dorsum of the hand and of the foot), and, clinically, have seen a transition into the characteristic discs of tinea tonsurans maculosa, and have found an abundance of mycelial threads in the epidermic layers of these discs; and, lastly, in a typical case of erythema papulatum, I found an abundant meshwork of mycelial threads in the epidermis at various parts, and on several successive days.[1]

In addition to herpes circinatus, there are also several other dermatoses, which have been identified by many authors with herpes (tinea) tonsurans, partly on account of their mere external resemblance to it, and, partly, because a fungus resembling the trichophyton has actually been regularly found, or because an association with tinea tonsurans has been demonstrated (eczema marginatum, sycosis parasitaria).

From these circumstances it has resulted, that, though, according to Hebra's account in the year 1854, already quoted, the clinical features of herpes (tinea) tonsurans appeared tolerably well defined and simple, it is not so at the present day, for some consider that herpes (tinea) tonsurans cannot be well defined from herpes circinatus, sycosis, eczema marginatum, and even alopecia areata and vitiligo. These processes, therefore, have been regarded at one time, as mere morphological or developmental varieties of herpes (tinea)

[1] See my article on the "Etiology of Erythema multiforme and Herpes iris," 'Arch. f. Derm. u. Syph.,' 1871, 3 H., p. 381. I have sketches of both cases, representing the clinical aspects of the cases and also the microscopic conditions.

tonsurans and at another, as etiologically related to it, but still independent processes.

Bärensprung, for instance, in his treatise on 'Herpes—Serpigo—Ringworm,'[1] enumerates, under the head of morphological varieties of herpes tonsurans; herpes vesiculosus=herpes circinatus; herpes papulosus; herpes capillitii=herpes tonsurans; porrigo asbestina; herpes pustulosus=impetigo figurata=porrigo scutulata; herpes furfuraceus s. pityriasis rubra; herpes inguium and, lastly, herpes unguium. Bärensprung also describes an "erythrasma," due to a special form of fungus (*Microsporon minutissimum*) and characterised by well-defined, red, scaly patches affecting the inguinal and axillary regions,[2] and which he obviously had previously identified with herpes tonsurans.[3]

This subdivision of herpes (tinea) tonsurans by Bärensprung into seven morphological varieties, founded partly on unimportant modifications and partly on differences in situation, is very confusing to the learner. On the other hand, to those who are well acquainted with the disease, it is evident that Bärensprung has really closely observed the varieties of form presented by the disease. It was essentially an original discovery, at that period, that he should be aware of the affection described by Hebra as eczema marginatum, and should have referred it, on account of its parasitic nature, to herpes tonsurans—as Köbner did subsequently.

Bazin, again, gives a fresh mode of representing herpes tonsurans. He describes three stages or phases of development, which he says may be observed with consistent regularity in the course of herpes (tinea) tonsurans, and each of which has, for a time, a specially characteristic aspect; the first stage is attended by the formation of red discs or circles which subsequently desquamate, or of rings of vesicles, and corresponds to the erythema marginatum and erythema circinatum (Rayer), eczema squamosum, herpes squamosus (Cavenave), and the vesicular form of herpes tonsurans of authors. Bazin states, also, that herpes iris (and circinatus) differs from herpes tonsurans, though it may be combined with the latter. Whether maculæ or papules, vesicles or pustules, form the first symptoms, the characteristic feature of tinea tonsurans is

[1] 'Annalen der Charité,' 1855, l. c., p. 133.
[2] Ibid., 1862, x B., 1 H., p. 140.
[3] Ibid., 1855, 6 Jahrg., 2 H., p. 151.

its steady advance, uniformly, over the whole periphery. Simultaneously with these symptoms of development, the hairs break off over the area of the patch, signifying that they are infiltrated with fungus.

The second stage of the disease, according to Bazin, consists of the appearance of the fungus (Trichophyton) on the surface of the skin; in the form of "asbestos sheaths of dull white colour," surrounding the hair stumps; and as a "flocculent or lamellated mass," of a glistening white colour, on the surface of the epidermis.

In the third period, owing to the penetration of the fungus into the deeper parts of the follicles, inflammatory symptoms make their appearance in the form of pustules, tubercles, and subcutaneous abscesses; that is, it is the stage of "parasitic sycosis." About this time, the parasite will have disappeared from the surface of the skin, and there will be no signs, anywhere, "of sheaths or silvery lamellæ." Indeed, the fungus, even within the follicles, may be directly destroyed by the suppurative process.

In this sketch of Bazin's, there is both error and truth mixed together. We must certainly consider the statement that, at any period, the fungus is apparent on the surface of the skin in coherent masses perceptible to the naked eye, or as sheaths around the hairs, and lamellæ on the epidermis, to be quite erroneous.

The latest authors, either depend entirely, or essentially, on Hebra's original account, for the symptomatology of ringworm; as Neumann,[1] White,[2] and others; or copy, almost literally, Bazin's expressions; for instance, the English authors, Anderson, Fox, and Wilson.

Symptomatology.

We understand by tinea (herpes) tonsurans, a disease of the skin caused by a parasitic fungus and characterised by the formation of red, scaly discs and circles, or groups and circles of vesicles, and by the breaking off and shedding of the hairs on the parts affected.

Though under any circumstances, the changes set up by the process are essentially those mentioned, yet considerable differences

[1] 'Lehrb. der Hautkrankh.,' 4 Aufl., Wien, 1876.

[2] "Vegetable Parasites," 'Third Annual Report of the State Board of Health,' Boston, 1872.

in the external appearance of the course of the disease, and its behaviour to treatment, are met with, according to whether the disease occurs on the scalp (or on parts of the face provided with long thick hairs, or the regio pubica or the axillæ); or, on smooth parts, that is, having no hair or only lanugo hairs.

TINEA (HERPES) TONSURANS OF THE SCALP.

On the scalp, tinea tonsurans occurs, as a rule, in the form of disseminated, isolated, irregularly distributed, rounded discs of the size of lentils, fourpenny-pieces, or half-crowns, over the area of which the skin appears as if it had been "plucked," or as if the hair had been cut at these parts by some one not at all skilful in the matter. The growth of hair at these parts is markedly scanty compared with that in the neighbourhood. The diseased parts attract the eye therefore. The hairs are at some distance apart, of unequal length, partly broken short off, and then, as a rule, look as if covered with dust, are poor in pigment, yield readily in tufts to the slightest traction of the fingers, or break off short. The aspect is that of a badly executed tonsure.

The surface over the affected area is covered by a layer of white, dry, lamellated scales, varying in thickness and tolerably adherent. Here and there, especially at the margins, are small, yellow, or blackish-brown crusts.

If we remove the superjacent layers of scales by means of oil and soap, or mechanically, the diseased patches of skin generally appear moderately congested, somewhat swollen and projecting slightly above the general level, œdematous on pressure, sensitive, smooth on the surface, covered with glistening epidermis, or, especially at the periphery, with clear vesicles of the size of millet seeds or smaller, or with red, weeping points and pits corresponding to such.

At parts where the disease has only just established itself, we perceive a small group of tiny vesicles on a red base; on other parts, yellow-brown crusts, corresponding to vesicles which have dried up.

Rarely, and then mostly only at the commencement of the disease, we find but one single patch on the scalp. As a rule, it is not long before the disease spreads to several parts. We can,

therefore, in such cases, study the development and course of the disease very well, for we may see it at the same time in different stages.

It will be clear on careful examination, that tinea tonsurans begins, from the first, by the formation of a group of vesicles, or of a single vesicle, to which are soon added others at the circumference. The vesicles soon dry up into yellow-brown crusts, whilst at the periphery fresh vesicles appear. In this way the disease spreads in the form of a disc. After some days the central crust falls off. The skin here appears red and scaly. The larger the area affected, the larger is the desquamating tract, whilst the periphery alone shows vesicles and crusts. Discs of the size of fourpenny-pieces, or of half-crowns, are generally covered throughout with scales; vesicles and crusts only appearing on the margin, and then, only when the process is advancing peripherally. The vesicles, owing to their small size and short duration, are easily overlooked, even at the commencement of the disease.

Larger patches, which, *eo ipso*, are also older, generally appear as scaly patches. It is only after the removal of the scales, that one sees vesicles or weeping pits.

Shedding and breaking of the hairs, and loss of lustre are generally early symptoms, so that patches of tinea tonsurans of the size of lentils, only, attract attention, at once, by their scanty covering of hair, and the dirty appearance of the hairs found within the affected areas.

The process does not spread equally from all the affected points in a peripheral direction. Some patches never become larger than fourpenny-pieces, others are as large as half-crowns, whilst others become as large as the palm of the hand, or larger. When such steadily advancing and adjacent discs come in contact, large, irregular patches result, with borders which are curved towards the margin of the hair, red and smooth, or vesicular, whilst the part situated more internally is uniformly covered with thick, white layers of scales, and stumps of hairs of unequal length, or may here and there be quite bald. The whole scalp may in this way be converted into a uniformly red surface, covered with white scales, as in seborrhœa capillitii, psoriasis, or eczema squamosum, excepting that in tinea tonsurans, the changes in the hairs, already noted, are noticeable at the same time.

The only subjective symptom present is moderate itching.

Excoriations are produced by scratching with the finger-nails, and the formation of pustules and crusts which results may to some extent modify the typical aspect of the disease.

As a rarer complication, we meet with an acute outbreak of eczema vesiculosum et impetignosum of the scalp, which attacks the parts affected by ringworm, just as much as those which are free from the mycosis. The copious gummy secretion then dries up into massive honey-like crusts. Under such circumstances, the ringworm may occasionally be quite obscured.

As a rule, such an outbreak of eczema has but a short duration. At the end of from three to six weeks, it will have almost disappeared, and though in some parts, especially on the ear and in its neighbourhood, there may still be redness, scaliness, weeping, and formation of crusts, some ringworm discs will be apparent, and in a characteristic form, after the subsidence of the acute inflammatory symptoms.

TINEA (HERPES) TONSURANS ON PARTS, OTHER THAN THE SCALP, PROVIDED WITH HAIR.

Like the scalp, the hairy parts of the face, the pubic region, and the axillæ, may also be affected with ringworm. In all these situations, which are, at any rate, much more rarely affected, ringworm produces quite analogous discs and rings, which are red, covered with crusts, and, later, with scales, and the hairs become brittle and are shed over the affected areas. Mostly, also, we meet with the macular and vesicular forms of ringworm to be described subsequently, at the margin and in the neighbourhood of these smaller hairy tracts, on the adjacent parts of skin free from hairs.

Just as in ordinary eczema of the scalp, that due, for instance, to pediculi, or in eczema of other hairy parts, the face, for instance, or the mons veneris, inflammatory symptoms of a severe character, such as tubercles, pustules, and red papillary granulations, that is, all the symptoms of an exquisite sycosis, may arise, so also, the same may occur as the result of ringworm. These tubercular and pustular formations, together with the papillary excrescences resulting from them, represent, therefore, a true sycosis, such as may arise from any eczema. And this is the sycosis which, because it

occurs in connection with ringworm, Bazin,[1] Köbner,[2] Anderson,[3] and others have designated sycosis parasitaria.[4]

Whilst at an early period, the characteristic discs and circles of ringworm are usually met with in association with the sycosis mentioned, so that the character of the affection is perfectly obvious, it is common, in the later stages, for these symptoms to have disappeared. Then, the parasitic nature of the sycosis can only be proved by the discovery of fungus in the hairs and their root-sheaths. It would appear, however, that the sycosis may remain as an independent malady, after the parasitic fungus has been destroyed and has wholly disappeared, in consequence of the persistent inflammatory and suppurative processes.

The *course* of tinea tonsurans, both on the scalp and on other hairy parts, is exceedingly chronic, and extends over many months, or even several years. This long duration is partly caused by the fact that the separate patches may have existed many months before the process in any of them comes to a standstill, and, also, because fresh foci of disease appear, now at one part and now at another, set up by contagion from the older ones.

The disease invariably ends ultimately in cure. Without obvious cause, the process ceases to advance, and the symptoms begin to diminish, both as regards the separate patches, and, also, finally, after the lapse of months or years, all the affected parts. The desquamation becomes less, the skin becomes pale and normal, the hair does not become so brittle, nor does it fall out so much, new hairs spring up copiously, and though at first they are scanty, lanugo-like, with little pigment, and also partially fall out, they subsequently are developed in a normal condition, are of proper length, and have a normal duration; in short, there is a complete *restitutio in integrum*, so that the parts previously diseased cannot be detected in the least.

It does not by any means always happen, however, that all the affected parts become so completely healed. After ringworm has lasted for a long time at any one part, some of the follicles, or all of them over a small area, become completely destroyed, so that small

[1] Bazin, l. c.

[2] Köbner, 'Virch. Arch.,' xxii B., 1861, and 'Exper. Mittheil.,' and also, in association with Michelson, in 'Arch. f. Dermatol. u. Syph.,' 1869, 1. H.

[3] 'On the Pathology of the so-called Eczema marginatum and Sycosis,' Edinburgh, 1868.

[4] See vol. ii, p. 303, &c.

bald patches remain. The skin over these parts has either, in other respects, a quite normal appearance, or shows a number of white, cicatricial, small points and spots corresponding to the individual follicles, but it never has that widely-diffused cicatricial aspect such as is observed after favus.

TINEA (HERPES) TONSURANS ON PARTS OF THE BODY WITHOUT HAIR.

On the parts of the body without hair, that is, properly, having only lanugo hairs; the trunk, extremities, and face, ringworm presents essentially the same symptoms as when it occurs on the scalp. The aspect of the disease differs in many respects, however, from that seen when the scalp is affected, owing to the different circumstances of the case.

At one time, the disease commences by the development of distinct, clear vesicles of the size of millet seeds or of pins' heads —tinea tonsurans vesiculosa; at another, with the formation of red, desquamating discs and circles—tinea tonsurans maculosa. These two forms are not by any means so distinct from one another as to represent two special kinds of tinea tonsurans. Their differentiation indicates, merely, the predominance of one or other formation, and is advisable on account of the partial difference in their course and clinical aspect, from which, also, are derived various signs for their recognition and differential diagnosis. Both forms may be met with in combination, and the epidermis is raised from the centre towards the periphery in the macular form in the same manner as in the vesicular form; but, the quantity of fluid exuded, lifting up the epidermis in the form of papules or scales, is so slight, that no distinct vesicles are formed, or only a few here and there.

TINEA TONSURANS VESICULOSA.

In this affection, vesicles with clear contents, superficially placed, and, therefore, with thin epidermic coverings, are developed, either in a disseminate form, or arranged in groups from the first. They are of the size of millet seeds or pins' heads, and of only short duration. Even after a few hours, many of them subside, either

from evaporation or absorption of their contents, their roofs becoming broken up into scales. Others, which are larger, become flattened, and allow their contents to escape, the latter soon drying up into a yellow scab, or contents and roof dry up, together, into a crust. In the meanwhile, the small hyperæmic spot which corresponds to the original vesicle spreads steadily in a peripheral direction, and forms, primarily, a red margin, which may be flat, or tolerably elevated, and on this arises a circle of vesicles, which surrounds the central crust or scale. In the course of a few days, owing to steady peripheral advance, the circle rapidly attains the size of a fourpenny-, or sixpenny-piece, or more, and the older vesicles go through the retrogression above mentioned, whilst a new circle of vesicles forms on the youngest and most peripheral part. Occasionally, a second concentric ring will quickly form outside the first one.

The larger the circle thus formed, the larger will be the area already healed in the centre. Under such circumstances, we see, in the centre, quite pale skin; further outwards, it is somewhat deeply pigmented; further still towards the periphery, are white scales on a pale ground, which becomes reddish further out; and, at the extreme periphery, is a red margin, somewhat raised and covered with vesicles.

All the primary vesicles do not by any means undergo such development. Many become abortive. Many develop into small circles, and then the process is checked, so that the youngest vesicles dry up, their crusts fall off, and the part is at first pigmented of a brown tint, but subsequently becomes quite pale and normal.

Some circles, however, may attain very considerable dimensions, measuring several inches in diameter, and may either have spread from separate centres, or may have resulted from the peripheral boundaries of several adjacent circles having united into one serpiginous line. In such tracts, the central part will, as a rule, have already regained a quite normal appearance, and all one sees, is a complete, or interrupted circular margin, from one to two lines broad, red, elevated, and covered with vesicles or crusts, or, in an inward direction, showing a covering of scales.

In the situation of this border, and the part adjacent to it in an inward direction, the skin is occasionally considerably infiltrated, so that it here feels firm and tolerably resistant.

Occasionally, the vesicles of tinea tonsurans vesiculosa are developed in considerable numbers, and of an unusual size, that of a pin's

head, or larger. In such a case, and corresponding to the greater amount of exudation, the redness and swelling of the skin will be moderately severe. The larger quantity of fluid exuded under these circumstances dries up into thick, yellow, gummy crusts, so that the appearance of the eruption resembles that of a very moist, acute eczema. Fever also may accompany such an eruption if it is spread over a large part of the trunk. By close observation of the symptoms present, however, we can definitely make out that the acute exudative process spreads from separate centres peripherally, and is attended by the peripheral formation of vesicles, and this character becomes more capable of demonstration, if we watch the progress of the disease for a day or two. The most difficult patches to decide on correctly are those extensive tracts which have developed from separate foci, or from several confluent patches, and which, for instance, surround the chest. For, in such, the peripheral crops of vesicles are very often wanting, and the whole surface appears uniformly red, the skin is swollen and covered with thick scabs, or, in the central portions, with scales. The aspect is that of an eczema squamosum, or of a psoriasis diffusa or annularis, and, looking at the circular margins and the intense infiltration, very much like that met with in syphilis ulcerosa serpiginosa, or herpes zoster.

If we perceive, however, that the patch noticeably advances rapidly, within twelve or twenty-four hours, by spreading congestion and desquamation (diffusion) of the epidermis, if we find also, that outside the large patch, either adjacent to it, or at a distance, there are small groups or circles of vesicles, and that the disease does not spread in the direction of the cutaneous nerves, we cannot fail to recognise the affection as tinea tonsurans.

The *course* of tinea tonsurans vesiculosa is of very varied duration. It is, as a rule, the more acute, the more intense are the symptoms of inflammation, the hyperæmia and swelling of the skin accompanying the formation of vesicles, and this intensity is also proportionately expressed in the size of the vesicles produced. In the severely inflammatory forms, the disease lasts from six weeks to three months. The centres of the large patches, or the parts which were earliest affected, are the first to return to a normal state, whilst the process still advances peripherally, and fresh centres make their appearance in adjacent or remote parts of the face, trunk, extremities, or neck. At last, the large patches cease to spread, and no

fresh parts are attacked. Everywhere the process of involution advances. The skin becomes pale, the crusts fall off, the desquamation lasts a while longer, but ultimately ceases altogether, the diseased parts having in the meanwhile become quite white (sometimes, however, somewhat pigmented), smooth, and pale, in fact, quite normal.

Occasionally, some patch of skin or other, which has been attacked with tinea tonsurans, will remain affected for a much longer time, and will appear congested and desquamating, or fresh crops of vesicles will be produced, and weep. This secondary affection does not by any means partake of the character of tinea tonsurans, but, of ordinary eczema squamosum or rubrum, such as may develop on any portion of skin which has been the seat of an inflammatory process; in this case, tinea tonsurans.

Whilst, in most cases, such a diffused and intensely inflammatory tinea tonsurans vesiculosa completely disappears within some two or three months, leaving no trace behind, in many cases, the disease still remains at certain parts, in the form of a small or large circle, desquamating towards the centre, and bounded by a red, raised margin, firm to the touch.

Several such circles, or even one solitary one, may often be the sole representative of tinea tonsurans vesiculosa, for, in the majority of the cases, we do not find the widely diffused eruption above described, but merely a single circle, or only very few patches.

Whether remaining from a general eruption, or arising, from the first, as an isolated circle of ringworm, such a one will always have a very chronic course. It advances by slow degrees, remaining for many weeks or months, or even, now and then, for years, at the same stage of development, without any marked change, or, at the most, only that the redness and desquamation of its margin, and the itching associated with it, may occasionally become more severe, or less noticeable, or that the contour may be interrupted, here and there, by spontaneous involution and healing. At last such ringworm circles also disappear spontaneously. The longer they remain, the longer also will the affected portions of skin subsequently remain deeply pigmented. Such is the progress of the annular forms of ringworm met with at the margin of the hair, on the back of the neck, on the forehead, or on the face (either with or without ringworm of the scalp, or of the hairy parts of the face), on the trunk, and on the extremities.

If, however, the rings have appeared on a part of the skin which is continually in contact with some other opposing portion of skin, and, therefore, liable to be constantly bathed in perspiration, that is, under conditions which are highly favorable to the growth of a fungus, and the development of a mycosis; for instance, on the inner surface of the thigh where covered by the scrotum, on the surfaces of chest and breast in contact with one another, on the skin of the axillæ, or the furrow between the buttocks; then, ringworm may last in such situations for ten or twenty years or longer, in fact, uninterruptedly, unless removed by some therapeutic interference.

On the trunk and extremities, we meet by far more frequently with the form of ringworm known as

TINEA TONSURANS MACULOSA,

than with the vesicular form just described.

As a rule, it is an acute and universal eruption.

The skin of the trunk and of the extremities appears all at once as if strewn with smooth spots and papules of the size of pins' heads or small lentils, of a pale red tint, somewhat raised above the general level, and paling under the pressure of the finger. Occasionally, the skin everywhere is somewhat hyperæmic, and feels warmer to the touch, and the patient becomes somewhat feverish, has a coated tongue, and loses appetite.

After the lapse of a few hours only, we remark that many of the smallest spots have delicate white scales in the centre, produced by the sinking in and breaking up of the previously elevated epidermis. The peripheral portions of these spots are still smooth and red. The separate papules and spots then spread rapidly. The peripheral portion is the part most recently diseased, red, smooth, and glistening. The fissuring of the epidermis runs radially from the centre to the circumference. If the separate spots have attained the diameter of a centimètre (·4″) they will no longer be circular, as a rule, but oval. The aspect of the disease, which, during the first few hours of its onset, is but little characteristic, and closely resembles that of various other acute eruptions (an acute outbreak of psoriasis or eczema papulosum, roseola syphilitica, or variola) becomes, during the further development described, very well marked. On the third or fourth day of the disease, as a rule, we notice on

the tender skin of the inner surface of the upper arm, numerous red papules and spots, of which scarcely any show a central desquamation, whilst, on the trunk, there will be already a great number of discoid or oval spots, of the size of lentils or fourpenny-pieces, covered with epidermis, fissured from the centre towards the periphery, and bounded peripherally by a broad red margin, and, between these, again, there will be numerous red papules and spots, which spring up rapidly and do not desquamate as yet.

In the course of the next eight or fourteen days, many discs attain the size of half-crowns or more. Such large spots in the meanwhile lose the scales in the centre, and the skin then appears pale, or slightly pigmented, and smooth, whilst it is only towards the peripheral red margin that scales can be seen. At last the red margin also pales and flattens, the desquamation now reaches the extreme periphery of the disc, the scales fall off, the whole spot soon loses its pigment, and finally appears white, normal.

Many of these larger discs unite with adjacent ones. Red gyri are thus produced enclosing desquamating areas, and, lastly, we have extensive desquamating patches, which subsequently become pigmented, and then, finally, they also resume their normal state.

All the individual patches do not by any means, however, go through the same process of development. Most of them, on the contrary, retrograde abortively, or, at most, only attain the size of lentils or fourpenny-pieces, and then undergo involution. As the trunk, as a rule, shows the greatest number of spots, so, here, also, we principally find the larger and confluent discs.

However rapid may be the onset of the initial forms of the eruption, with the characteristic symptoms of redness advancing from the centre to the periphery, and the rapidly following slight desquamation advancing in a similar way, the disease, as a whole, nevertheless, lasts, as a rule, for from two to six months. This long persistence is partly due to the fact that the separate spots which develop into large discs take many weeks in the process, and partly to the fact that, during the first four or six weeks, fresh spots constantly spring up, and go through the same course as the older ones. After this period no fresh spots usually appear.

As a rule, after involution of the separate discs, and without the appearance of any fresh spots, the disease completely disappears in from three to six months without leaving any trace behind.

Occasionally, however, a ring may remain here and there,

especially in the parts mentioned as favourite situations for ringworm, such as the groin, ham, &c., and may persist for many months or years.

Sometimes a large and old patch of tinea tonsurans maculosa may become the seat of vesicular and pustular eczema, which may then persist as an independent disease, and may even give rise to outbreaks of eczema in other parts of the skin. This complication is met with, as a rule, in the later stages of the affection, and may so alter the type of the disease, that only those who are very familiar with the malady can recognise it under these circumstances.

The eczematous eruptions are, in part, undoubtedly, due to the scratching induced by the itching which accompanies ringworm, and which, in the later stages, may be tolerably severe. In many cases, also, it will be excited by inappropriate treatment.

In choosing and making use of our remedies, we must, therefore, bear this in mind, and we shall speak in more detail on the matter further on.

TINEA (HERPES) TONSURANS OF THE NAILS.

(*Onychomycosis trichophytina.*)

The finger-nails, and possibly, the toe-nails, may become diseased from the same cause which produces ringworm, that is, the trichophyton tonsurans. Mahon called attention to the coincidence of disease of the nails and tinea tondens. But it was not till many years after the discovery of the fungus belonging to ringworm, that a similar one was found in the substance of the nails.

The nails appear to be affected with the change known as atrophy.[1] They are dry, opaque, discoloured, traversed by clear or opaque furrows, humpbacked, crippled, thickened at their anterior borders, fissured, separated into lamellæ, and brittle. In the few cases of disease of the nails which have been closely examined and proved to be due to the fungus of ringworm, the affection was confined to a few finger-nails. As the disease cannot, clinically, be diagnosed from analogous changes in the nails, such, for instance, as result from eczema, psoriasis, lichen ruber, scabies crustosa &c., the parasitic nature of the degeneration of the nails, can, as a

[1] See vol. iii, p. 248.

rule, be determined only by its association with unmistakable tinea tonsurans of the scalp, or of the skin generally, and, especially, by the microscopic demonstration of the presence of the fungus. The latter is, indeed, sometimes, the only way in which the discovery can be made, for the mycosis of the nails does not, like that of the skin generally, spontaneously disappear, but persists for an indefinite period afterwards, alone.

In addition to the affections of the nails caused by favus and ringworm, there have also been recorded other forms of onychomycosis. At present, however, it remains doubtful whether in these cases there was really any other fungus present than the trichophyton or achorion. First of all, Baum and Meissner, in the year 1853 ('Arch. f. phys. Heilk,' xii B., p. 193), reported on a fungus found in the gryphotic nails of a man, aged 80. Soon afterwards, Virchow ('Würzb. Verh.,' 1854, v. B., p. 102) and Förster ('Spec. path. Anat.,' 1854, p. 878, Atlas, Taf. xiii, fig. 7) made similar communications. Lastly, Virchow, in the year 1856 ('Archiv,' 9 B., p. 580), expressed the opinion that onychomycosis occurred much more frequently than the other kinds of mycosis in man, and he there (Taf. iv, fig. 8) figured the nail fungus which, on the whole, chiefly resembled the trichophyton of Malmsten, but differed from that of Meissner. Virchow thought, however, that also several other kinds of fungus might be present in onychomycosis, and even in the same nail. Köbner, who published two cases of ringworm of the nails ('Virch. Arch.,' 22 B.), also considered the fungus described by Virchow to be identical with that of tinea tonsurans. On the other hand, Bärensprung ('Charité Ann.,' l. c., p. 100) thought Meissner's fungus identical with that of ringworm. Kleinhans also (in his translation of Bazin's work, p. 111 *et sequ.*) reports four cases which came under his own observation.

At the present time, the existence of any onychomycosis not caused by favus or ringworm must be regarded as doubtful. In no case has it been shown, as Virchow thought possible, that several kinds of fungus existed side by side in the same nail. I believe, however, that in gryphotic nails, consisting for the most part of loosened and disintegrating tissue, fungus elements of all sorts may easily become located; but these are not, under such circumstances, the cause of the onychogryphosis, and the latter is not in the least a mycosis.

MICROSCOPIC CONDITIONS IN TINEA (HERPES) TONSURANS.

In whatever locality and in whatever form, ringworm may be met with, the essential anatomical basis of the process is, invariably, the presence and vegetation of the fungus discovered by Malmsten and Gruby, and named by the former, trichophyton tonsurans. This has been more or less carefully figured or described by all authors who have written on the subject since.

In the description of the favus fungus, I have already mentioned the influences which have led to the great divergence met with in the morphological details of the dermatophyta furnished by different authors, and that, owing to the multiplicity of these forms, and according to the present status of mycology, such details can neither be exhaustive, nor have other than a relative value.

I have, therefore, preferred to illustrate as correctly as possible the conditions revealed by my preparations, and thus to reproduce them here objectively, rather than to go into minute details of description of the separate forms, and give the proportions of the elements down to the 0·0001 mm. (·000004″). They contrast strongly, even at the first glance, with most of the illustrations given hitherto, apart from the fact that many of the latter are manifestly diagrammatic.[1]

The trichophyton is met with in the hairs and their root-sheaths, and in the epidermic layers, in tinea tonsurans vesiculosa et squamosa, and also between the cells of the nails, in onychomycosis.

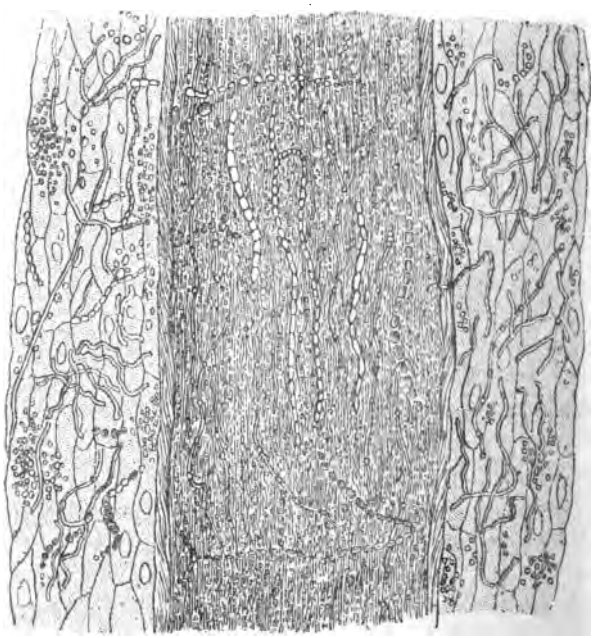
In ringworm of the scalp, or of the beard, the fungus is found with the greatest certainty in the hairs, which can be easily extracted, bringing along a portion of their root-sheaths, and, also, in the stumps of the broken hairs.[2] I have invariably found it much easier to discover hairs loaded with fungus in ringworm, than in favus, because, in the latter, the fungus is generally only in the root-sheath. It has been stated by some that the hairs first of all

[1] If we look at the illustrations of hairs infiltrated with fungus given in many books, the fungus elements will be seen to be out of all proportion to the dimensions of the hair, and to have a similarity of form which, as my figures show, manifestly does not correspond to the reality.

[2] By *scraping* a patch, minute fragments of hair will be removed loaded with fungus. This is often more satisfactory than pulling out hairs which may not contain any fungus. The hair should previously be cut short over the patch. (Tr.)

become dry, brittle, and split up, owing to their becoming swollen into nodes, here and there, and that it is only then, that the fungus penetrates into the hair from the surrounding epidermis and root-sheath. I have not been able to assure myself of this. I have found hairs abundantly infiltrated with fungus which were not at all split up. It appears to me that the splitting, breaking up into fibres, and the breaking off of the hairs, are merely the effects of the growth of the fungus in the interior of the hair.

The forms in which the fungus is met with in the root-sheath, and in the shaft of the hair, are extraordinarily varied, as may be seen from Figs. 8 and 9, representing two hairs which I extracted at the same time from the same disc of ringworm on a boy's head, and which, after having been rendered transparent by solution of potash, were sketched under the microscope. At the same time it may be seen, how extraordinarily abundant the fungus-felt in



a *b* *a*

FIG. 8.—Hair and hair root-sheath, from tinea tonsurans of the scalp (Hartnack, oc. 3, obj. 9 à immersion, mag. 700 diam.); *a a*, the root-sheath; *b*, the shaft of the hair. Both are copiously infiltrated with mycelium, polymorphous gonidia, and chains of gonidia.

the hair is. We see, in the first place, in the one hair (Fig. 8), remarkably fine, smooth-margined, unbranched, or only rarely branching, straight, or somewhat tortuous threads, in the interior of which are small corpuscles, resembling nuclei, at considerable intervals from one another. They appear to be made up of separate, very long cells, noticeable by the corpuscles placed in them. Other threads appear to be jointed, and of incomparably larger calibre than the former. The members are either firmly united together, or appear quite loose, or are arranged in a row with considerable intervals between. The jointed threads may be either single or branched, the members being of unequal size, even in the same mycelial thread, oval in shape, or more cylindrical, transparent, or dark, and refracting light strongly. The greater part of the threads run parallel to the long axis of the hair, only a few passing horizontally or obliquely. Some send branches backwards. At one spot, we may see a large gonidium, to which are attached several cells becoming smaller and smaller in succession (probably they have separated as if by strangulation (abschnüren)), an appearance frequently seen in favus. In addition, there are isolated, and grouped, large and very small spherical structures.

Between the cells of the hair root-sheath, we find similar fungus elements to those in the hair; smooth-bordered mycelium and jointed threads, straight and unbranched, as well as branched, and also radiating from a central nucleus or gonidium, like the spokes of a wheel; gonidia, large and small, down even to the smallest, rounded and polygonal, isolated, or in rows, like beads, transparent, and dark; and, also, rows of cells, apparently constantly pushed forward from a central larger one.

In the hair represented in Fig. 9, taken from the same boy as that from which Fig. 8 was obtained, one is struck, at once, by the enormous quantity of mycelial threads, traversing it in all directions, and their tolerable uniformity. Everywhere the threads are of the finest calibre. At the same time, one gains an insight into the meaning of the nuclei scattered, here and there, on the fine smooth-margined threads. We see, clearly, that these threads consist of long, biscuit-shaped cells, and that between each pair of them, a small rounded body is interposed, which, in some cases, is organically connected to the long cells, and, in others, simply lies loosely in contact, or, in alternation with them, merely aids in forming an interrupted chain of elements.

The mycelial threads and the cellular fungus elements described infiltrate, chiefly, as a rule, the portion of hair enclosed in the root-sheath, but, in many hairs, they reach for a considerable distance

b *a* *b*

FIG. 9.—Hair without the root-sheath, from a case of tinea tonsurans of the scalp (Hartnack, oc. 3, obj. 9, à immersion, mag. about 700 diam.); *a*, hair; *b b*, cuticula of the hair. The mycelium infiltrating the hair is much finer and more uniform than that in fig. 8.

upwards, into the free portion of the hair-shaft, and downwards into the hair-root, which is very often split up like a brush, but, also, often appears smooth and club shaped.[1]

[1] See, also, the two following papers:—'On the Condition of the Skin in Tinea tonsurans,' by George Thin, M.D. (Med. and Chir. Soc., March 26th, 1878, reported in the medical papers.) The author had examined sections of skin from a horse affected with ringworm. Specimens were taken both in the earlier and later stages. The spores of the trichophyton were found amongst the most superficial scales of the horny layer of the epidermis. They were found in the cutis, only, on the shaft of the hair, and between the shaft and the internal root-sheath. The spores, in no instance were found in the root-sheaths, the hair-root, or the hair papilla, nor in the connective

We find the same fungus elements that we meet with in the root-sheath and the hair (filaments and gonidia, and very small granular

tissue surrounding the hair follicle; that is to say, the spores were never found in actual contact with living tissue, the space between the internal root-sheath and the hair-shaft being analogous to the most superficial stratum of the horny layer. The affected hair first bent, and then broke at a point usually midway between the rete mucosum and the hair-root. This the author attributed to the disintegrated hair yielding to the pressure produced by the normal growth of the hair-shaft upwards. The changes found in the tissues of the cutis and rete mucosum were sometimes extensive, and were similar to those found in inflammation from whatever cause it arose. The spaces between the bundles of connective tissue were more or less infiltrated with colourless blood-corpuscles (pus-cells), the walls and immediate neighbourhood of the blood-vessels being thickly studded with them. Retrogressive changes were found in the nuclei of the cells of the rete mucosum, and at some parts the epidermis had completely broken down, leaving the cutis denuded. In the latter case, the surface was found covered with pus-cells. Small localised abscesses were found in the external root-sheath and in the rete mucosum. The cell infiltration descended along the veins to the deepest part of the cutis. The author, finding these well-marked inflammatory effects in tissues which contained no vegetable organism, suggested that they were due to the irritation which is produced by the absorption of soluble matter set free during the growth of the fungus. The parasite found its pabulum amongst effete epidermic structures, and could only assimilate by decomposing them. This theory seemed to be the only reasonable one, because the effects produced were far in excess of those which might be expected to follow the pressure attending the distortion of the hair. The incapacity of the fungus to exist in living animal tissues explained the *modus operandi* of the very numerous methods of curing ringworm. Many of the substances applied were simple irritants, whilst the parasiticides in common use were also irritant. Inflammation, when sufficiently acute, cured ringworm, as was shown by the fact (adduced by the author) of a simple wound through a ringworm-spot curing the whole patch. It was thus that the beneficial effect, in chronic cases, of a continued slight congestion was explained. The author further pointed out the probable injurious effect on the general health, of the continued absorption of the irritating matters produced by the growing fungus.

'On the Condition of the Skin in Tinea tonsurans,' by Frederick Taylor, M.D. (Roy. Med. and Chir. Soc., Nov. 13, 1878, reported in the medical papers.) The subject of the disease was a child, who died of tubercle of the cerebellum. The ringworm was only partially treated. In the early stage the hair retained its form, and had within it, simply, a varying number of mycelium threads, running parallel to its length. In the later stage, the hair was obscured by a crowd of spores, closely packed in the follicle; in the middle of these, the outlines of the hair were seen; but its substance seemed to be completely destroyed, or replaced by mycelium threads running in a longitudinal direction. In a downward direction, the fungus did not reach

structures), between the epidermic layers of the surface of the skin; both in the plaques of the scalp, and in the maculæ, discs and rings of tinea tonsurans vesiculosa et maculosa, affecting parts of the skin covered with lanugo hairs.

We find well-formed mycelium, most certainly and quickly, on the older discs and rings and, especially, near the periphery. Its proper seat is the boundary between the lowest plates of the horny epidermis and the upper layer of the juicy rete cells (see Fig. 10 *a*, *b*). In the deeper layers of the Malpighian cells, the fungus cannot be detected. As a general rule, therefore, in tinea tonsurans, it is more superficially placed than in eczema marginatum, which, by many authors, on mycological and clinical grounds, is regarded as identical with ringworm, and in which the fungus penetrates remarkably deeply into the epidermic layers. For microscopical examination, we remove the loosened epidermis over some part mentioned, and to the required depth, by means of a fine scalpel, held at right angles to the surface, spread it on a slide, and examine, after the addition of weak potash solution, acetic acid, glycerine, or any other fluid suitable for clearing up the epidermis. In the epidermis of the most external

beyond the upper end of the bulb of the hair. The hair papillæ were never invaded. Laterally, the spread of the fungus was limited by the inner root-sheath, with which, in advanced stages, the spores were in contact. The integrity of this sheath was maintained, even where the follicle was choked with spores. The outer root-sheath never showed any traces of fungus, nor did the follicle walls, the subcutaneous tissue, cutis, and mucous layer of the epidermis. So much of the horny layer of the epidermis as remained in the specimens, showed no fungus, even in the immediate neighbourhood of diseased hairs. The diseased hairs were not twisted or broken as in Dr. Thin's specimens, nor were any but the merest traces of inflammatory action present. From these results it would appear, that the fungus invaded the hair proper and advanced in its substance down towards the bulb; that it never advanced far into the bulb, or attacked such tissues as the root-sheaths; that its growth in the follicle was determined by the supply of hair from the papilla, the freshly formed cells resisting its action, till, in their turn, they assumed the characteristics of the proper hair substance; that, should the papilla fail to form new hair-cells, the fungus must shortly starve. With reference to treatment, epilation could not ensure the extraction of the fungus, as the hair would give way in the shaft, leaving the mycelium threads near the bulb ready to advance on the new cells as they became hair. On the other hand, the natural fall of the hairs, or the same fall, could it be artificially produced, would, by separating the hair from the papilla, effectually turn out the whole disease, reinfection of the new hair being prevented by the contraction of the follicle walls around the retreating stump.—(Tr.)

margin of the ring, which is not yet desquamating, but merely red and swollen, the fungus elements can only be detected with difficulty, and, in the central portions which are nearly healed, they cannot be found at all.

The greatest difficulty is experienced in demonstrating their presence where the inflammatory and exudative symptoms are severe, or where large vesicles have been formed. In the latter case, it is generally the deeper layers of the raised roof of the vesicle, not the epidermic layers of the base of the vesicle, which harbour the fungus chiefly. But even, here, it is not always easy to find the fungus quickly, because the epidermic cells are swollen and pressed asunder by the serous infiltration, and the fungus threads are collected in greater quantities in some parts than others, which, indeed, may appear wholly free. The best plan is to break up and examine, not the very old vesicles, but, the coverings of those which are just drying up.

It is quite as difficult to demonstrate the fungus, on ringworm patches which have just made their appearance, as on patches in general, in which the process very quickly passes through its course, or from which it quickly passes away. Thus, it is very difficult to find well-developed mycelial threads during the first few days after an outbreak of ringworm, where papules and spots, merely of the size of pins' heads, are strewn all over the body, or where there are merely very small red discs, desquamating in the centre, to be met with. We only find the imperfectly characteristic, granular and nuclear-like structures which resemble the contents of epidermic cells. Towards the end of the first, and in the course of the second week, where patches of the size of fourpenny-pieces, or larger, and desquamating freely in the centre, are present, it is easy to demonstrate the presence of abundant mycelial layers. In Fig. 10, I have given a representation of a preparation from tinea tonsurans vesiculosa, because, in this affection, as in any other form of ringworm having an acute course, it is not by any means easy, always, to demonstrate the presence of fungus.

We see mycelium of tolerably uniform calibre, and with smooth margins, or jointed, or having septa at regular distances, long and straight, as a rule, simple, or branched, and, here and there, verticillate. Some threads without septa are exceedingly fine. In addition, there are heaps of granules, isolated, remarkably large, ovoid,

strongly refracting gonidia cells, and, also, smaller, rounded, and polyhedral ones, arranged in chains.

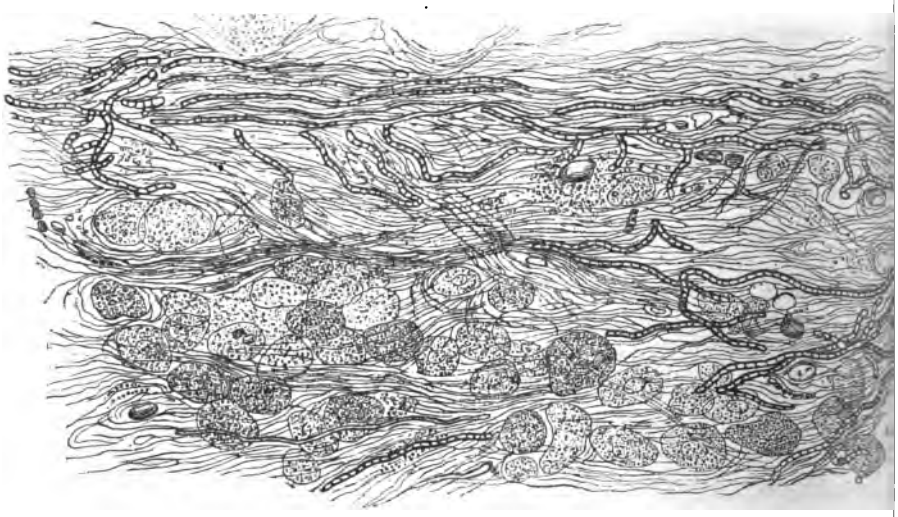


FIG. 10.—Epidermic scales from the submaxillary region, in a case of tinea tonsurans vesiculosa, in a boy (Hartnack, oc. 3, obj. 9); *a*, deeper layers of the flat epidermic cells; *b*, upper layers of the nucleated rete-cells.

As to the botanical position of the fungus peculiar to tinea tonsurans, described first of all by Malmsten and Gruby, we are no better able to speak positively, than in reference to the achorion, or the relationship of the latter, to the former, as, indeed, will be evident from what has been stated in the foregoing chapters.

Robin referred the trichophyton to the torulaceæ, and Küchenmeister merely reproduced the morphological and systematic views of Robin. Wedl briefly asserts that the fungus of tinea tonsurans closely resembles that of favus. That a similarity of the mycelium and spores, alone, according to the present state of mycology, is quite insufficient to enable us to estimate the species of a fungus, we have already shown, in our general remarks, and, also, that the systematic estimation of the trichophyton has, even up to the present time, been left undecided, both by botanists and pathologists. The only botanist who has particularly supported the views of Robin is Hallier. He, however, originally, derived the trichophyton from *Penicillium*, and, subsequently, from *Aspergillus*, the same mould fungus from which he also considers the parasite of pityriasis versi-

color is derived—a view which is so utterly opposed to the clinical conditions, that pathologists must at once put it on one side.

Etiology.

Under whatever form, tinea tonsurans may make its appearance, the symptoms of the disease are, invariably, equally due to the presence and vegetation of the vegetable parasite described. This is shown, both by the actual demonstration of the presence of the parasite, which is possible in every case, and the numerous cases in which the accidental or experimental transmission of the disease has been placed beyond doubt. And both the separate symptoms of the disease, and, also, the conditions under which they subside spontaneously, or under the influence of treatment, may be thoroughly explained by the presence and mode of propagation of the fungus.

As we can, by repeated microscopic examination, follow quite well the progress of the vegetation of the fungus, both in accidental and experimentally produced tinea tonsurans, the relation of the fungus to the symptoms of the disease has been positively ascertained in almost all details.

In the first place, the fungus takes root in the superficial epidermic layers, after the most superficial layers of all have been removed by maceration, or some other mechanical means. The fungus elements act as a foreign body, irritating the subjacent papillæ. These become hyperæmic. The part becomes congested and appears as a red spot (tinea tonsurans maculosa). If the patient's skin, or that particular portion of skin, is specially irritable, the hyperæmia increases to such a degree, that serous exudation follows, and then, if the exudation be moderate, the epidermis is loosened, and then, after evaporation of the serum, lifted up in scales (tinea tonsurans squamosa) or, if more abundant, is raised into vesicles (tinea tonsurans vesiculosa). The fungus is lifted up with the epidermis, for, it never grows deeper and never penetrates into the corium. Thus it happens that, at the spot originally diseased, the fungus is eliminated by the very exudative process started by itself, and here, therefore, a spontaneous cure must result. On the other hand, the parasite grows at the periphery of the original focus, in the layers of the adjacent epidermis, where it excites the same symptoms as in the part first attacked. The peripheral advance of the morbid phenomena and the subsequent

involution following in the same direction are thus easily comprehended.

On parts provided with deep hair follicles and thick hairs, such as the scalp, the beard, &c., the process obtains a special stability, owing to the fact that the fungus gains a hold on structures which can neither be thrown off so quickly, nor so completely, as the epidermic strata of the surface of the skin; that is, the fungus grows in the layers of the root-sheath and the hair itself. Owing to the infiltration of the hair, in all directions, by the fungus, and the ploughing up of the root-sheath, the nutrition of the former is disturbed; it becomes dry, lustreless, and brittle; it also splits up at many parts, and, at last, breaks short off, just above its point of exit from the follicle, and the remnant is subsequently shed altogether. That the hair should become diseased, and should break up, before the fungus penetrates into it (Bärensprung), I cannot believe, for, I have seen many hairs in a good state of preservation, which were nevertheless copiously infiltrated with mycelium. It is quite certain that the degeneration and the fissuring of the hair are, solely, or almost entirely, the direct results of infiltration of it with fungus. Just as in the case of the growth in the epidermic layers of the surface of the skin, the fungus, by its accumulation in bulk in the epidermic layers of the hair follicle, may excite irritation and the formation of tubercles and pustules, producing, in fact, the symptoms of sycosis parasitaria (Autor.), or of herpes tonsurans pustulosus (Bärensprung).

Also, even after spontaneous or remedial elimination of the hair loaded with fungus, remains of the latter, together with a portion of the root-sheaths, may be left, and thus become a source of contagion to adjacent parts, or to the hair subsequently growing up in the same follicle.

Lastly, in consequence of persistent disturbance of nutrition, follicles here and there may be completely and permanently destroyed.

In addition to the *direct* cause of tinea tonsurans, that is, the trichophyton, may be also mentioned, as *remote or indirect* causes of the origin and extension of the disease, all those conditions which favour the planting and development of the fungus in the skin generally, and its transmission from one individual to another, or from the lower animals to man, and from one part of the skin to another.

In the first place, it is well known that tinea tonsurans is very frequently met with under conditions which favour the vegetation of the mould fungi. Thus, tinea tonsurans rings are often seen to develop on patches of skin which are kept in a state of moisture by cataplasmata and warm moist applications. After undergoing a cold-water cure, and on returning from bath resorts, where body linen which has not been previously well dried is commonly brought in contact with the skin, and the bath rooms and sitting rooms contain much mould, many patients constantly bring back tinea tonsurans with them; and we shall seldom be wrong in accusing any one who shows a diffuse outbreak of tinea tonsurans over his body, of an abuse of daily cold ablutions, or of the cold-water cure. As eczema is also very likely to arise under similar conditions, these affections very commonly present the combined appearances of eczema and of tinea tonsurans, or of well-marked eczema marginatum, which, in association with persistence of the evil influence, or even after the removal of the cause, may remain for many months and years, long after the exciting cause has been forgotten by the patient.

Maceration of the epidermis by the perspiration from the skin is just as potent a predisposing cause of the origin and persistence of tinea tonsurans, as maceration from cataplasmata, baths, &c. For this reason, the very chronic rings are mostly met with on the inner surfaces of the thighs and the corresponding parts of the scrotum, on the under surface of the mamma and the corresponding surface of the skin of the chest, on the skin of the armpits, &c.; on parts where two surfaces of skin are permanently in contact with one another.

It must not be forgotten either, that certain meteorological conditions, especially long-continued rainy weather, favorable to the growth of mould, are, also, equally favorable to the appearance of tinea tonsurans, whether it be that the trichophyton flourishes more readily under such conditions, or from any other unknown cause. It is certain that not unfrequently, many weeks and even several months may pass without a single case of tinea tonsurans coming under observation, or, at least, only a very few isolated cases. Then there are times, especially in spring and autumn, when a remarkably large number of cases of ringworm are met with. I have never, at any time, seen, here, in Vienna, so many cases of tinea tonsurans of all sorts—of the scalp, of the diffused macular kinds, or of the

isolated ringed forms, &c.—in so short a period as during the first half of April in the present year (1876). There were nearly thirty; and this is a large number to occur in Vienna and in my own practice.

From what has already been said, it will be gathered that abundant opportunity is afforded for the idiopathic development of ringworm.

At the same time, the contagiousness of tinea tonsurans plays an important part in the rôle of the etiology of the disease. Ringworm is very highly contagious. It is very quickly implanted, and, it would appear, with tolerable ease on every sort of skin. Hence the rapid spread of the affection from one portion of skin to another, in the same patient, or from man to man. It is but rarely that the affection remains confined to one member of a household for any long period. Within a short time, all the children in a family or in a school, and even the adults, will be attacked by the disease; and yet we know that there is no volatile contagium in the case, though we must not altogether deny the possibility of transmission of the spores of the fungus through the air.

A tolerably frequent source of tinea tonsurans in the human subject will be found in the like affection of certain of the lower animals—horses, cattle, cats, dogs, and rabbits. Owing to the statements of the older authors (Alibert) on this point, and the more recent and more exact data furnished by Letenneur,[1] Bazin,[2] Gerlach,[3] Bärensprung,[4] Fox,[5] Tuckwell,[6] Köbner,[7] Michelson,[8] and many others, the fact that tinea tonsurans may be transmitted accidentally, or purposely, to man, from the animals named,[9] and, in part, *vice versâ*, has been so thoroughly established that it would be superfluous to adduce, here,

[1] Letenneur, 'Reflexion sur l'herpès tonsurans,' Nantes, 1852.

[2] Bazin, 'Recherches sur la Nature et le Traitement des Teignes,' Paris, 1853.

[3] Gerlach, 'Die Flechte des Rindes,' Berlin, 1857.

[4] Bärensprung, 'Annal. der Charité,' 1857, 8 Jahrg., 1 H., und ibid, 1862, 10 B., 1 H. See, especially, the complete bibliography.

[5] 'Clinical Society's Trans.,' vol. iv.

[6] Tuckwell, 'St. Barth. Hosp. Rep.,' 1871, vol. vii.

[7] Köbner, 'Klin. und Exp. Mitth.' K. has inoculated tinea tonsurans on rabbits.

[8] Michelson, 'Berl. Klin. Wochenschr.,' 1874, No. 11 u. No. 33.

[9] Vincens ('Herpes tons. bei Thieren,' Paris, 1874) and Horand ('Lyon Méd.,' 1874), in their attempts at inoculating tinea tonsurans on the lower animals, have found that rats do not take this affection, though they do favus well.

any further special observations, such as we ourselves have had plenty of opportunity of making.

Occurrence.

Tinea tonsurans is a far more frequent disease than favus. The inconspicuousness of the malady, and the fact that, except on hairy parts, it disappears spontaneously, and, even on the scalp, is neither disfiguring nor remarkably troublesome; that it is most frequently children, and several children of the same family, who suffer from the affection; and, lastly, the fact that the treatment has usually to be continued for a long time, and can be carried out very well by private means—all these circumstances lead to the result, that but a very small proportion of the patients affected with tinea tonsurans come under care in public institutions. So that the statistics obtained from hospital reports do not afford any guide as to the absolute numbers of such patients.

Whilst favus predominates in young persons of the poorer classes living in a state of wretchedness, tinea tonsurans is met with in all stations of life and among individuals living under the most favorable conditions—just as frequently as among those less happily circumstanced.

As a rule, tinea tonsurans occurs much more frequently among young persons, than among adults, and in all possible forms. Tinea tonsurans of the scalp is almost exclusively, however, met with in young persons. Among adults it is an exceedingly infrequent occurrence. On the other hand, the general eruptions of tinea tonsurans maculosa, and the chronic forms limited to the genito-crural regions and the flexures of the joints, are more common in adults.

Though cases of tinea tonsurans are met with at all seasons of the year, they may occur during certain weeks in remarkable abundance. Such an outbreak will generally coincide with a period of long-continued wet weather. That we may also meet with an aggregation of cases under other circumstances, is obvious, when, for instance, an outbreak of the disease occurs under circumstances favorable to the spread of the disease by contagion (in training institutions, barracks, schools, &c.).

Diagnosis.

As the trichophyton is an essential and absolute sign of tinea tonsurans, the microscopic demonstration of the presence of the fungus peculiar to the disease will, at all times, be necessary for scientific diagnosis. But this aid to diagnosis is not so easily obtained in practice. It is scarcely possible in hospital, and still less in private practice, to defer our diagnosis of a case of disease coming under our care, until we have demonstrated the fungus under the microscope. A microscopic examination often demands an amount of leisure and special experience which are not at the command of every practitioner. And mistakes in reference to distinctions from other mycoses may possibly be made, apart from the errors of fact into which those who are but little practised in mycology may easily fall.

It is, therefore, for this reason, highly desirable that the diagnosis of tinea tonsurans, like that of other skin diseases, should be placed on a purely clinical basis. As a matter of fact, this is quite feasible. All that is necessary in order to make a diagnosis is to keep the clinical symptoms detailed above well in mind, and it will only be in doubtful cases, or for the sake of demonstration, or scientific accuracy, that it will be necessary to prove the presence of the fungus by the microscope.

In weighing the clinical symptoms, we must not lose sight, at the same time, of the other morbid processes, whose symptoms closely resemble those of ringworm, and may be confounded with them. Owing to the multiplicity of the forms under which tinea tonsurans is presented to us, the objects and conditions of differential diagnosis are also very variable and manifold.

The diagnosis is very easily made in tinea tonsurans of the scalp, when there are several disseminated, tonsure-like patches, covered with stumps of broken hairs, because we here have a perfectly well characterised form of disease. Still more certainly, may the disease in this situation be recognised, if, at the same time, there are scaly rings on the adjacent portions of skin, on the forehead or neck, because these two sets of symptoms point to the same diagnosis. At the same time, we must bear in mind that in eczema, also, we find red, scaly patches, and in psoriasis and lupus erythematosus, in addition, there are annular forms; in lupus erythematosus, there are tonsure-like patches and red elevated patches with annular outlines,

and, in all these processes, the hair comes out readily, or may be shed.

When tinea tonsurans is diffused over the whole scalp, and the latter is covered with thin, white, laminated scales, it may not only be confounded with the two processes named, but also with seborrhœa, and even another mycosis—favus. I must, here, confine myself to a mere enumeration of the forms of disease liable to be confounded with tinea tonsurans, and refer to the discussion of their symptoms and the points of differential diagnosis, in the chapters devoted to these diseases (Eczema, p. 117, &c., vol. ii; Psoriasis, p. 5, &c., vol. ii; Seborrhœa, p. 110, &c., vol. i; Lupus erythematosus, p. 16, &c., vol. iv); and in regard to similar appearances in syphilis, I must refer to my illustrated work on syphilis, already quoted.

In respect to its diagnosis from favus, the remarks already made must be again adduced; that even microscopic examination will not suffice to distinguish one process from the other, because the achorion and trichophyton can hardly be distinguished from one another mycologically, and tinea tonsurans of the scalp precisely resembles the appearances seen a few days after the scutula of favus have been removed. Apart from the presence of patches of cicatricial atrophy, which would indicate favus, an observation extending over a period of three or four weeks would suffice, because, during this time, the favus scutula would develop in an unmistakable manner, whilst, in tinea tonsurans, the state of affairs would remain unaltered.

Ringworm occurring on the trunk and extremities also affords various difficulties as regards the differential diagnosis from various processes already partly enumerated. In the first place, an acute general eruption of tinea tonsurans maculosa closely resembles a maculo-papular syphilide, just making its appearance, or an acute general eruption of psoriasis.

We have often seen mistakes made between tinea tonsurans maculosa and roseola syphilitica. Such an error may be easily avoided by a little care and experience. The spots of roseola syphilitica never desquamate. The spots and papules of tinea tonsurans, when they have only existed for a few hours, show a characteristic central desquamation. And when once, after several days, larger, ovoid, and circular discs, desquamating in the centre, are developed, we shall find representatives of the whole series of

developments, from the primary spots and papules, to the larger foci of disease, side by side, and thus be enabled to recognise the character of the affection easily.

This applies to the differential diagnosis from psoriasis, in which, in a case of general, acute eruption, within six or eight days, large plaques will have already developed, and, owing to their uniform redness, and uniform and thick accumulations of scales, will readily be distinguished from the discs of ringworm, in which the congestion and desquamation are most pronounced at the periphery, and least in the centre.

Tinea tonsurans vesiculosa, as previously mentioned, has been regarded by many authors as identical with herpes circinatus (erythema circinatum). I must, therefore, here again call attention to the characteristic features of herpes circinatus laid down by Hebra, p. 378, vol. i, and the essential points of which have been recapitulated at p. 191 of the present chapter. In addition to its regular development from a herpes iris, its typical and acute course, we must lay special stress on the density (deep situation, and, therefore, thick epidermic covering) and the size of the vesicles of herpes circinatus, in contrast to the small, extremely superficial, and thinly-covered ones of tinea tonsurans, and, also, on the typical localisation of the former disease to the backs of the hands and the feet.

Nevertheless, it cannot be denied that under certain circumstances, it may be a very difficult matter to distinguish between tinea tonsurans vesiculosa and herpes circinatus, and, indeed, pemphigus circinatus, if the vesicles of the former are large, and occupy particular positions. As soon as, in the course of further development, large, red, desquamating discs and circles have arisen out of the groups of vesicles, the character of the process is unmistakable.

As a rule, very little difficulty is experienced in diagnosing the tolerably well recognised, chronically persistent rings bounded by a red margin, and desquamating towards the centre, common to all forms of ringworm, and which one sees so frequently in the groin, on the surface of skin at the upper part of the thigh, in contact with the scrotum, on the scrotum, on the labium majus and its vicinity, in the armpit, on the under surface of the breast and the corresponding surface of the chest, and, also, on other favourite parts, on the neck, on the extremities, &c. Yet, there are cases in which the

affection resembles syphilis annularis,[1] on account of the dark-brown colour, the density and smoothness (slight scaliness) of the margin around the rings; or, *vice versâ*, the latter may be mistaken for the former.

If the portion of skin included within the margin, be cicatricially atrophic and slightly depressed, then we have to deal with syphilis. For, it is only in the latter disease, that an essential feature consists in an infiltration into the corium, which leaves atrophy of the skin behind it, after it has disappeared.

It is more difficult, however, occasionally, to distinguish between the rings of tinea tonsurans, and psoriasis annularis, for, both processes are epidermal. The presence of ordinary psoriasis, on the elbows, knees, &c., is only a comparative help, in such a case, for the two processes do not mutually exclude one another.

In such a case, as in all others which are doubtful clinically, the microscope must decide.

In regard to *eczema marginatum*, which some authors consider a mere developmental form, and others, a variety of tinea tonsurans, whilst Hebra considers it a special form of eczema,[2] due to a fungus or associated with one, it is highly desirable, from a practical point of view, that we should distinguish it from ringworm, whatever our scientific standpoint may be. Eczema marginatum forms circles and circular figures, which do not have so smooth a surface, nor run so uniformly, as those of tinea tonsurans, but, are much interrupted, and covered with numerous papules, vesicles, and crusts. The itching associated with it is remarkably severe, and the symptoms resulting from scratching are never wanting. Its course is exceedingly chronic. It remains in one and the same situation for ten or twenty years. It resists treatment most obstinately, because the fungus peculiar to it grows deeply in the substance of the epidermis, and, for the same reason, probably, it recurs over and over again, in the same situation. It is certainly not by any means so inoculable, nor so contagious, as ringworm, though its inoculability has been experimentally demonstrated by Köbner and Pick.

For all these reasons, it is desirable that these two processes should be separated clinically. Mycologically, no distinction can be shown. The fungi agree morphologically with one another.

[1] See my work, 'Ueber Syphilis der Haut, &c., Taf. xxxi und xxxii.

[2] See Appendix to present vol. (Tr.) and 1 Th., 2 Aufl., d. W., p. 485.

Their clinical differences are enumerated in detail under the head of eczema marginatum, and we must refer our readers to this account for further particulars (see *Appendix*, &c.).

Treatment.

The pathological conditions and the therapeutic indications in connection with tinea tonsurans are precisely the same as in favus. In both, the fungus vegetation is the essential cause of the disease, and its removal is indispensable as regards cure; and, in both, the same difficulties have to be encountered, at least when the disease is located on the scalp and on hairy parts in general, in removing the fungus from its hiding place in the layers of the hair root-sheath and of the hair, and in effecting its destruction.

For this reason, the methods of treatment employed in tinea tonsurans of the scalp and hairy parts of the face, or elsewhere, are just the same as in favus of the same parts. The accumulated epidermic masses must first of all be removed by the application of oil and washing with soap, then, the hairs over the affected areas should be extracted, and, afterwards, parasiticides, in the form of ointments, oils, alcoholic or ethereal preparations, should be rubbed in, and continued steadily for many weeks or months, if necessary. As these procedures precisely resemble those recommended in favus, as already mentioned, we need only refer to the suggestions given at p. 183. As regards epilation, however, we must remark that in tinea tonsurans it is even more necessary than in favus, and should be done very carefully and with forceps. The latter, because the hairs are mostly broken off short, and, therefore, cannot be seized with the fingers. The former, because, in ringworm, far more hairs are affected by the fungus, and much more severely so, than in favus.[1]

How long the treatment suggested must be continued, cannot, as a rule, be estimated beforehand. The smaller and fewer the patches of disease, and the more carefully the individual patches are daily and properly treated, the sooner will a cure follow. On an average, from three to six months must be allowed for a well-developed case of ringworm of the scalp. Isolated and small patches, owing to

[1] Henry ('American Journal of Syphilis and Dermatol.,' iv, 1) recommends the use of a pair of "epilation forceps," for ringworm, which are just the same as those recommended by Deffis, for favus. We find the ordinary forceps quite sufficient.

our being able to deal daily with each follicle, may be cured in three or four weeks.

The external signs of cure are, that the redness, swelling, and desquamation disappear, that the margins of the patches are no longer to be recognised, and that the hairs everywhere begin to grow normally, and can only be extracted with difficulty. We must, of course, here, as in favus, examine the scalp industriously for several weeks after the supposed cure, as to whether, here and there, fresh spots make their appearance or not. It is only when no further, red, desquamating spots or vesicles, and no more broken hairs can be perceived at the end of a prolonged period of observation, and the growth of hair is everywhere normal, that we can say with any certainty that the case is cured.

As, from what has been said, it is clear that it is tolerably difficult to recognise the exact point of time when there is no diseased spot left and no single hair any longer affected, it would be a very fortunate circumstance if Duckworth's[1] statement could be depended on, that in the application of chloroform, we possess a ready means of distinguishing hairs affected with fungus from those which are quite free, since the former, under the influence of chloroform, take on a peculiar opal-white colour, whilst the healthy hairs remain wholly unchanged. I have not been able to confirm this observation, but have found that all the hairs, even on quite healthy parts, appear rough, and as if covered with a fine powder, manifestly because the epidermis on the surface has been very quickly deprived of its fat by the chloroform, and made very dry.

Much care is required in the choice and method of employment of remedies in ringworm of the trunk and extremities and parts provided with lanugo hairs generally. It will not suffice to use such a simple procedure as in favus. In ringworm, the fungous growth is not limited to the apertures of the follicles, but is spread over large and numerous tracts of the epidermic layers.

The principle of the treatment is, however, here the same—elimination and destruction of the fungus, together with the epidermic strata containing it. This result will be obtained, however, more or less quickly and completely by very different means according to circumstances.

It is of the first importance to bear in mind that the epidermis

[1] "On a New Method of Determining the Presence of, and Recovery from, True Ringworm," 'Brit. Med. Journ.,' 1 Nov., 1873.

must be removed from the parts affected with fungus for such a depth, and in so short a time, that the fungus remaining, and possibly capable of germinating, should have no opportunity of growing between the layers of the newly-formed epidermis supplying the place of the old. Among such remedies may be mentioned, soft soap, solution of caustic potash, tar, sulphur, tincture of iodine, glycerine of iodine, acetic acid, &c. &c. It must also be borne in mind, however, that the healthy parts of skin will be acted on by these remedies, as well as the diseased parts; and, lastly, that the destruction of epidermis necessary all over the body in widely diffused tinea tonsurans will not be borne by the skin, nor by the organism generally, either at the moment or after desquamation has resulted, without corresponding reaction. It is only those who take these circumstances into consideration, and understand how to select their remedies and methods of procedure accordingly, who will succeed in curing ringworm with certainty. He who, from ignorance or carelessness, disregards the necessary precautions, not only finds a difficulty in curing the existing malady, but also inflicts on the patient a second and probably still more troublesome and less certainly curable disease—in fact, artificial eczema.

We will, therefore, here sketch out the methods of treatment and the remedies to be employed in typical cases of ringworm.

In the acute stage of tinea tonsurans vesiculosa, so long as vesicles continue to be rapidly formed and the portions of skin affected show evidences of inflammation, redness, and swelling, in any marked degree, and especially if these symptoms are spread over large tracts, a mild treatment should be adopted, as in acute eczema, the most suitable being dusting on starch. An active mode of treatment—that by caustic remedies, for instance—would only unnecessarily increase the inflammation and pain, and not shorten the duration of the disease, as a whole, in the least.

After from three to six weeks, as a rule, the inflammatory symptoms, and, also, sometimes, the special symptoms of ringworm will have disappeared, or the orbicular and squamous forms will have developed. In the latter case, the disease may be attacked directly, just as we should a tinea tonsurans maculosa.

Apart, therefore, from the acute inflammatory form, ringworm may be treated under any circumstances, whether in isolated patches or distributed over the whole body, according to the principles above laid down.

This is most suitably effected by a plan which removes the whole of the epidermis harbouring the fungus, within from ten to fourteen days; for, in addition to the short period required for the cure, it also has the advantage of uniform action and thorough certainty.

If we have to do with a case of universal tinea tonsurans maculosa, for instance, we prescribe a cycle of inunctions with soft soap. Sapo Viridis is rubbed in, as a salve, over the whole body—with the exception of the face and the scalp, where it is but seldom that spots are met with, and, then, they can be removed by washing with soap. In doing this, the palm of the hand used for the purpose should be dipped from time to time in lukewarm water, as the soap is thus diluted, and can be rubbed in more uniformly. The soap is now allowed to remain on the skin. The patient is placed in bed between blankets, or clothed with woollen jacket and trowsers. The latter is less advisable, because the patient with clothes on will certainly move about, and the soap will thus be rubbed off the skin. In well-to-do patients, however, to whom a few days more or less is of no consequence, the great convenience of this concession may be allowed.

This inunction of soft soap must be repeated morning and evening, the skin, meanwhile, being left unwashed. A cycle of twelve inunctions; that is, therefore, six days, being sufficient on the average.

Even on the third day, the epidermis on the more delicate parts of skin, on the neck, the scrotum and the bends of the joints, appears of a yellowish-brown tint, dry, parchment-like, wrinkled, and then fissured, and desquamating in large flakes. On such places, starch must be sprinkled and the inunctions discontinued, because otherwise the skin would soon become ulcerated. The scrotum must be protected from contact with the thigh, and from further maceration by soap and perspiration, by charpie dipped in starch, and a suspensory bandage.

On other parts, the inunctions must be thoroughly continued for six days. About the fourth or sixth day, the epidermis will everywhere have become wrinkled, but especially on the parts affected with ringworm, because the epidermis, here, will already have been disturbed by the fungus. Each separate patch of disease can, therefore, under such circumstances be easily recognised, and this enables us to regulate the treatment much more easily.

After the cycle has been completed, the skin must be sprinkled with powder several times, but must not be bathed. About the

tenth day, the dead epidermis will have desquamated. A young, white, spotless epidermis will have replaced the old. If the desquamation has pretty well ceased, from the tenth to the fourteenth day, the patient may take an ordinary bath. The cure is then finished. The skin is quite clean.

It is still necessary to protect the skin from anything which may irritate, or lead to itching and scratching, and produce eczema. Perspiration and water are especially to be dreaded. The patient must not bathe for at least a fortnight, must powder the skin thoroughly, in order to dry up any perspiration, and, if symptoms of eczema papulosum make their appearance, here and there, and do not yield to starch, or the application of alcohol, or alcohol and carbolic acid, the parts must be painted with Tinctura Rusci, which will certainly be successful. The avoidance of any secondary eczema, such as is always liable to ensue under any circumstances when the epidermis has been made to desquamate over a large extent, after the cure of scabies, for instance, must be the chief aim of the practitioner.

In individuals with particularly tender skins, especially in the young, and in females, the cycle must not extend to twelve inunctions. In such persons, even after from six to eight inunctions, a general reddening and moderate œdematous swelling of the skin ensue, as a rule, accompanied by a burning sensation and slight feverishness. In such a case, the cure is already completed as soon as these symptoms make their appearance. For, the serous infiltration then causes, even more efficiently and rapidly, a copious and general desquamation, and, at the same time, the elimination of the layers harbouring the fungus, and we patiently await the result, sprinkling on powder industriously in the meanwhile.

Instead of soft soap, we may use Wilkinson's salve, as modified by Hebra (consisting of sulphur, tar, soft soap, and lard), in the cycle of twelve inunctions above described, and with equal success. Indeed, though very disagreeable from its unpleasant odour and its colour, this salve is preferable to the soft soap in those cases in which symptoms of eczema and severe itching are added to the tinea tonsurans maculosa, for these symptoms will be removed at the same time.

Practitioners in India have repeatedly[1] recommended a vegetable powder—Goa powder—regarded by them as a curative agent in

[1] 'The Practitioner,' July, 1875, p. 14.

parasitic skin diseases, and especially in the chronic forms of ringworm and eczema marginatum. As it requires from six to twenty inunctions of an ointment containing it, to cure the mycosis, we do not see that it is in any way preferable to our own plans, for, by our own procedure, which we have ourselves proved, we can attain the desired result in as short a time and quite as certainly.

The Poh die Bahia and the Araroba powder in use in Brazil seem to be analogous to the Goa powder.[1]

Where it is not possible to complete the cure within ten or fourteen days, we may save the patient some of the inconveniences attending the use of the remedies named, by rubbing in a mixture of soft soap and sulphur, over the whole body, twice daily, by means of a stiff brush, until the epidermis is everywhere of a brown colour, wrinkled and desquamating; the formula being somewhat as follows:— ℞. Spirit. Sapon. Kalin., 150 grammes (℥v); Lac. Sulph., 10 grammes (℥iiss); Bals. Peruv., 5 grammes (gr. 75). Such a modification, or any similar one, however, prevents our estimating the duration of the treatment, and interferes with the absolute certainty of the result.

The same remedies and methods—*mutatis mutandis*—must be employed, when we have to treat within a short time and with great certainty separate patches of ringworm, such as are met with in the inguinal regions and other parts of the body; in a thoroughly analogus manner to the plan which has been described in detail for the treatment of eczema marginatum, at p. 162, &c., vol. ii, and *Appendix* to present volume.

Such isolated patches of disease may be treated with the same object in view—the destruction and removal of the epidermic layers containing the fungus—by other means, also, within a few days, provided they are used in the same way, being thoroughly and persistently applied in a cycle of from ten to twelve times; for example, this number of paintings with Oleum Rusci or Tinct. Iodi, or iodine and glycerine (Iod., Pur., Potass. Iod., āā 5 grammes (gr.

[1] Chrysophanic acid (or, rather, Chrysarobin, according to Liebermann), the active principle of Goa Powder, has been introduced into practice by Mr. Balmanno Squire (see his articles in the Pharmaceut. Journ.,' Dec. 16, 1876; 'Brit. Med. Journ.,' Dec. 23, 1876, &c., &c.). I have found it efficient. It causes great irritation in some cases, and, therefore, it is perhaps well to commence in the proportion of five grains to the ounce (of vaseline, &c.), and increase as borne. I cannot say it is more efficient than other remedies. (Tr.)

75), Glycerinæ, 10 grammes (ʒiiss)), may be used twice daily, the part being afterwards covered with gutta-percha paper (a painful method); or a sulphur paste may be employed, consisting of Lac. Sulphur., 10 grammes (ʒiiss); Spirit. Lavand., 50 grammes (ʒiss); Glycerinæ, 2·50 grammes (ʒss); and the like remedies, which, in part, as tincture of iodine and glycerine of iodine, as is well known, cannot be applied to extensive tracts of skin, time after time, without causing marked inflammation and pain.

Though the methods of treatment described may be recommended in all cases, on account of their rapidity and certainty of action, still they cannot be employed in all patients, because many are compelled from external causes (bed-fellows, employment), owing to the inconveniences attending those methods, to forego their advantages. They must be contented to obtain a cure by other means which are less offensive to the sense of smell, and whose employment does not interfere with their relations to others, though a longer time may be taken up in the treatment.

All remedies and methods of procedure employed in these cases have the disadvantage that they are much more tedious and unequal and uncertain in their action in unpractised hands.

Under such circumstances, the plan must be confined to daily frictions of the affected parts with soft soap, or spirit of soap, by means of a piece of flannel or flesh gloves; in universal ringworm, while the patient is in a bath; and in cases where the disease is confined to certain localities, without the bath. By this plan, part of the diseased epidermis will be mechanically and chemically removed. After a thorough wash, some parasiticide is applied—carbolic acid, creasote, benzine dissolved in alcohol or in the form of a salve, weak alcohol and sulphur mixtures, solution of bichloride of mercury (1 to 100 alcohol), and the like, such as we have cited in greater numbers and in various combinations under favus.

In any case, the treatment, under such circumstances, will be prolonged over many weeks, for, neither will the separate patches be dealt with energetically enough, nor will all be equally affected by the treatment. Also, eczema will be readily produced by the daily irritation of the whole skin. And, lastly, the possibility of a relapse is scarcely excluded by this method, for the fungus is not so certainly everywhere destroyed.

REMARKS ON THE SO-CALLED SYCOSIS PARASITARIA.

Whilst this sheet was going through the press, a case of sycosis parasitaria came under care, of so pronounced a character, that we do not recollect to have ever seen the like, here, in Vienna.

As Hebra (p. 303, vol. ii, &c.) has only given a conditional assent to the existence of a sycosis parasitaria, it seems especially incumbent on us to give the details of this case, coming under our own notice and proving the existence of this form of sycosis.[1]

The patient was a peasant from Hungary, of the age of 42, who came under Professor Billroth's care, on account of a tumour of the face, and who was sent to us, by the courtesy of our colleague. The malady had existed for four weeks. Extending from the right angle of the mouth, outwards and downwards, and involving the closely-shaved beard, was a firm cutaneous tumour, which was larger than a five-shilling-piece, was well defined, had steep margins, was lobulated on the surface, which presented holes and pits, was covered with stumps of hairs, and secreted an offensive sero-purulent fluid. Over the larynx, and beneath an excoriated surface the size of a four-penny-piece, a hard, firm, non-fluctuating tumour, of the size of a nut, and painful on pressure, had developed during the previous few days. The clinical aspect of the disease was that of ordinary sycosis, as described at page 307, vol. ii, where it is said, "Occasionally (in sycosis) we meet with tuberous elevations, resembling plâques muqueuses, or such as we may regard as boils, or some other inflammatory products." . . . "In other cases, we have an abscess bursting with many small openings, due to the confluence of many pustules situated in the deeper layers, resembling carbuncles, and developing partly, from the tuberous elevations mentioned, and, partly, quite independently, in the deepest part of the cutis. In yet other cases, superficial growths appear in the form of caro luxurians."

At pages 197-8, I have stated, in agreement with the authors there quoted, that this form of sycosis, as especially represented by Köbner and Michelson ('Arch. für Derm. u. Syph.,' 1869),

[1] See, also, "Cases of Tinea circinata (Ringworm) communicated from the Horse," by Tilbury Fox, M.D. ('Clin. Soc. Trans.,' vol. iv, 1871, p. 106). Several men attending on a pony affected with ringworm had patches on various parts of the upper extremities. One man had a patch on the left upper lip—parasitic sycosis. The microscope showed a luxuriant growth of spores and mycelium.—(Tr.)

may also be caused by the fungus of ringworm. The rings of tinea tonsurans are often present at the same time. In the case now quoted, there was no trace of ringworm, neither could any history be obtained of any connection with ringworm, nor, especially, of any inoculation from cattle.

As the assistants to Professor Billroth, and I, myself, found the hairs in the situation of the tumour described infiltrated with fungus, there could not, however, be any doubt as to the parasitic nature of this case of sycosis.

One of these hairs is represented in fig. 11. We see a limited, marginal portion of the hair infiltrated with an abundance of chains of remarkably large gonidia, which are, here and there, continued into smooth-margined and unjointed mycelial threads.

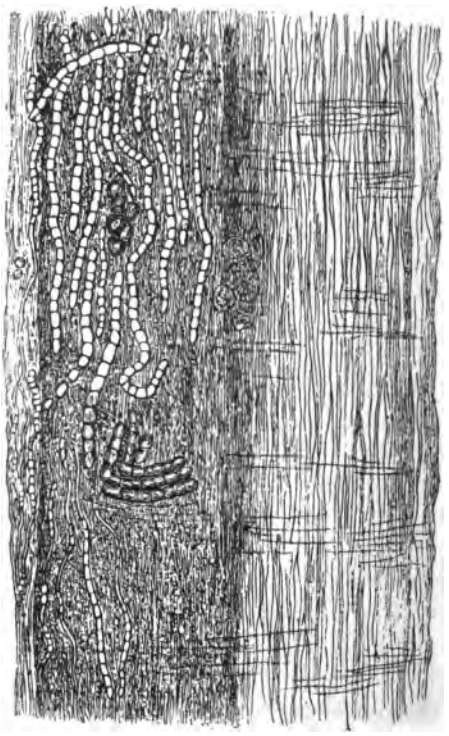


FIG. 11.—A hair from the beard in a case of sycosis parisitaria; *a*, the portion infiltrated with fungus; *b*, the part free from fungus (Hartnack, oc. 3, obj. 9).

It is worthy of note that such markedly inflammatory and pa-

pillary nodes and outgrowths, otherwise only met with in chronic states, should have developed in such an acute manner.

PITYRIASIS (TINEA) VERSICOLOR.

History.

The name pityriasis versicolor was introduced into literature by Willan. The malady, however, to which he applied this name was known from very early times, not only to physicians, but to the laity. The only point worthy of note is the curious circumstance that though the skin affection under discussion was unmistakably described by Sennert nearly 200 years before Willan, and carefully distinguished from pigment patches, such as chloasma, lentigo, and nævus pigmentosus; and though, since the discovery of the fungus peculiar to pityriasis versicolor, by Eichstedt, in 1846, the essential character of the disease has been clearly established; yet, even down to the present day, equally with the period during which Willan lived, even specialists of note have identified pityriasis versicolor with the affections named, or confounded them together.

In Pl. XVII, fig. 2, of his work,[1] Willan has represented yellowish-brown spots on the neck of a woman, and described them under the title pityriasis versicolor. He expressly declares them to be the same as those popularly known as "liver spots," described by Sennert, at the beginning of the seventeenth century, as "maculæ hepaticæ," and particularly distinguished from the pigment patches. He here refers to the passage in Sennert[2] on this subject, where he says: "Maculæ hepaticæ, vulgo notus est affectus, quem Germani Leberflecke nominant, procul dubio, quod ex hepate ortum habere credant; maculæ scilicet fuscæ, vel ex flavo nigricantes, latæ palmæ magnitudinæ, inguina imprimis et pectus et dorsum occupantes, imo totum pectus interdum obtegentes, cum cutis quadam levi asperitate, quæ squammas ut furfures quasi emittit, quæ tamen non uno loco hærent, sed hinc inde desseminantur, et modo evanescunt, modo rursus emergunt. Ipsæ quidem maculæ per se nihil periculi conjunctum habent, neque aliquam molestiam pariunt, cum non in

[1] 'Die Hautkrankheiten und ihre Behandlung von Robert Willan, aus dem Engl. von Friese,' Breslau, 1799.

[2] Sennertus, 'Med. pract.,' lib. 5, 3, 1, 6.

facie aut manibus—ut lentigines—sed in locis vestibus tectis aboriantur." Willan also expressly says further, that the dark-coloured spots, which are commonly met with in pregnant women, and the ephelides, do not come under the present category.

Of the anatomical conditions present in the brown spots named pityriasis versicolor, Willan does not seem to have had any correct idea, for, he says, quite erroneously: "Pityriasis versicolor cannot properly be regarded as a disease of the epidermis, for, when the latter is removed from any spot, the abnormal discoloration of the skin or rete mucosum remains as before." But, that he, as Sennert had done before him, correctly separated the maculæ hepaticæ from pigment patches, of all sorts, is obvious from the above quotations.

Nevertheless, his contemporaries and immediate successors made no distinction between the process named and the pigment abnormalities, and mention them under similar designations. Thus, Sauvages[1] makes the maculæ hepaticæ his fourth variety of vitiligo, under the name vitiligo hepatica, synonymous with maculæ hepaticæ Sennerti, ephelis Celsi, chaleur de foye of the French, Leberflechte Solenandri. Alibert gives expression to this confusion of ideas in the designation "ephelis hepatica," which he affixes[2] to Pl. XXVI, and his want of any clear idea as to the significance of the liver spots is shown by his statement that they are occasionally associated with affections of the liver, and are, then, "very dangerous." Jos. Frank only describes the "liver spots" in a rhapsodiacal manner, but obviously considers them as equivalent to the pigmentary abnormalities known as chloasma, for, he says, they may be produced by pregnancy. Fuchs, also, classes the 'liver spots' under pigment spots, as "chloasma vulgare."

In the year 1846, as already mentioned, Eichstedt[3] showed that the appearances known as liver spots were due to a fungus growing in the epidermis. One would have expected that, for the future, all physicians, and especially those who wrote on the subject, would have had clear views on the matter, and that all would agree as to name, and the significance of the process. But, however improbable it may appear, it is, nevertheless, a fact that even to the present time the old confusion of names and ideas prevails in

[1] Sauvages, 'Nosol. Method.,' Amstelodami, 1768, Tome i.
[2] Alibert, 'Description des Maladies de la Peau,' Paris, 1814.
[3] 'Froriep's Notizen,' 1846, xxxix B.

many quarters, though a large number of authors, such as Sluyter,[1] G. Simon,[2] Gudden,[3] Küchenmeister,[4] Bärensprung,[5] Hebra,[6] &c., have practically expressed correct views, and in conformity with one another.

This confusion is due, in some measure, to the fact that many authors, instead of confining themselves to the designation pityriasis versicolor, proposed by Willan, or that of Sennert, maculæ hepaticæ (both these authors having separated the malady, most definitely, from the pigmentary affections, and given it a special designation for that very reason), have applied designations which should belong only to the pigmentary abnormalties, to the affection caused by a fungus. Thus, Simon, for example, uses pityriasis versicolor and chloasma as synonymous designations for this malady, though he well knew its characters. On the other hand, Bärensprung[7] pleads for the name "chloasma hepaticum," instead of pityriasis versicolor.[8] With the German names, also, it fares no better. We find, even in the latest gynæcological text-books, that chloasma uterinum, a pigmentary phenomenon, is called "liver spots," and Hebra's attempt to distinguish pityriasis versicolor, as "Pigmentflechte," from "Pigmentflecken" (chloasma), is not at all a happy one, because pityriasis versicolor is not in any way allied to the pigmentary affections.

It is, therefore, not to be wondered at, if, owing to the perpetual confusion as to names, the ideas associated with them should also have become confused by the less initiated. But it is, nevertheless, astonishing that some of our modern specialists should participate in the confusion when writing on the subject. Thus, Er. Wilson ranks chloasma, meaning thereby pityriasis versicolor, without any hesitation, amongst the pigment alterations,[9] and, at the same time, throws doubt on the existence of the dermatophyton peculiar to it—as, also, he does in regard to each of the other mycoses—without

[1] 'Dissertatio de Vegetabilibus Organismi Animalis Parasitis, ac de novo Epiphyto in Pityriasi Vesicolori,' Berolini, 1847.
[2] G. Simon, l. c., p. 336.
[3] Gudden, l. c., p. 43.
[4] Küchenmeister, l. c., p. 48.
[5] Bärensprung, 'Deutsche Klinik,' 1855, No. 6.
[6] Hebra, 'Atlas der Hautkrankheiten,' Text, p. 15.
[7] Bärensprung, 'Annalen der Charité,' 1855, 6 Jahrg., 2 H., p. 124, Anmerk.
[8] 'Atlas,' l. c.
[9] Er. Wilson, 'On Skin Diseases,' 1863, p. 600.

being able to offer any other explanation of the affection. This author, however, subsequently, seems to be less confident of the truth of his opinion, but without expressing himself clearly[1] as to the essential differences between ephelides and pityriasis versicolor. And Bazin, who, on the contrary, recognised the microsporon of pityriasis versicolor, flattered himself he was acting scientifically in declaring this affection to be wholly identical with "chloasma or macula gravidarum and the ephelides," and ascribed to the latter the same fungus.[2] It is well known, however, that these processes are pigmentary abnormalities, and have absolutely nothing to do with a fungus.

I would propose that the popular designations, such as "Leberflecke" (German), "liver spots" (English), "chaleur de foye" (French), "maculæ hepaticæ," "chloasma hepaticum," "Pigmentflechte," "Leberflechte," and, in short, all the names which have hitherto caused so much confusion, should be at once done away with, and that only the name pityriasis versicolor, used by Willan, and sufficiently distinctive, should be applied to the parasitic malady under discussion; whilst the designations chloasma, lentigo, ephelis, &c., should be reserved exclusively for the pigment spots described in vol. iii, page 1 *et seq.*

Definition.

We apply the term pityriasis versicolor, therefore, to light or dark brown, smooth, or slightly desquamating spots, which are scarcely, or not at all raised above the level of the skin, are of the size of pins' heads or lentils, or the palm of the hand, or even larger; are tolerably well defined; occur chiefly on the trunk and the flexor surfaces of the upper and, more rarely, the lower extremities, never on the hands or feet or on the face; may be removed, with the greatest ease, by scratching away the epidermis corresponding to them; and are caused by a fungus—*Microsporon furfur*—growing in the epidermis.

Symptomatology.

The spots of pityriasis vesicolor are of a pale yellow, yellowish-, coffee-, or chocolate-brown tint (pityriasis nigra, Autor.), and, some-

[1] Wilson, 'On the Phytopathology, &c.,' 1864, p. 22.

[2] Bazin, l. c., 'bei Kleinhans,' p. 142.

times, so much resemble the colour of the skin, generally, that they can only be discovered with an exceedingly good light. In size, they vary a great deal. They may be of the size of pins' heads or lentils, or the palm of the hand, or larger, or may even occupy large tracts of skin. The surface is smooth, slightly glistening, dull, or covered with fine branny scales. They occur most commonly on the trunk, especially over the sternum and between the shoulder-blades, next frequently, on the inner surface of the upper arm, then, on the fore-arm, throat, and neck, as far as the margin of the hair and the line of the jaw, in the armpits, in the mammary furrow in women, and, very frequently, on the inner surface of the thigh, corresponding to the scrotum, more rarely, and in a less typical form, on the inguino-femoral region in women, and, lastly, in the popliteal space. The face, the hands, and the feet are never, and the leg very seldom, affected with pityriasis versicolor.[1]

The number and conformation of the patches vary exceedingly. We meet with cases in which all the localities named are more or less affected with pityriasis versicolor, and in other cases there may be only a few patches. The small patches are round or rounded. The larger ones are quite irregular in shape, but have well-defined borders.

When the disease is general, there may be scattered spots, varying in size from mere points to lentils, or there may be very extensive patches, covering, for instance, the whole anterior aspect of the thorax, and of a uniform colour, or of somewhat deeper tint at the margin, in addition to smaller spots. At many parts, also, such patches, of all possible dimensions and shapes, will have coalesced into irregular groups.

The portions of skin intervening between the patches of pityriasis versicolor are quite normal.

If we scratch one of these dark patches lightly with the finger-nail, the epidermis will peel off in small branny scales; and if we dig the nail in more energetically, we may remove the epidermis in thin, larger, coherent lamellæ. The surface exposed to view is somewhat

[1] It has been noted by the older authors (Sennert), as well as by modern ones (Gudden), that the patches of pityriasis versicolor are only met with in parts which are usually covered by the clothes. Gudden once saw the skin over the breast free in a case of generally diffused pityriasis versicolor, and thought this was due to the fact that the patient (a man) constantly had his breast uncovered. How far the influence of light is detrimental to the growth of the microsporon, I am not in a position to determine.

congested, or even bleeds slightly if deeply scratched. After a time the spot pales, and its brown colour disappears. The latter is removed with the loose epidermic lamellæ, in which the brownish-coloured substance is situated.

Often there are absolutely no subjective symptoms whatever. Many patients are quite unsuspicious of the presence of pityriasis versicolor, when situated on parts not exposed to their view. Others experience a slight itching sensation, occasionally, under the influence of perspiration, for instance. When certain authors have stated that patients affected with pityriasis versicolor have suffered from severe burning sensations, pricking, and itching, this has certainly not applied, solely, to the parts of skin affected by the pityriasis versicolor, but, also, to the rest of the skin, and these general sensations have certainly not been due to the mycosis under notice.

For the most part, it is the disfigurement caused by the variegated aspect of the skin, or the simultaneous desquamation, which leads the patient to seek advice; not unfrequently, also, there is a belief that the disease is connected with some affection of the liver.

Result of Microscopic Examination.

On microscopic examination, we find the fungus first of all discovered by Eichstedt, and named the Microsporon furfur (Fig. 12).

A comparison of the forms represented in the sketch (Fig. 12) from one of my preparations, with those hitherto published by other authors, will show that the *Microsporon furfur* is not, by any means, made up of such simple and uniform elements as has been hitherto represented; for instance, the mycelium is not merely simple and unbranched. On the contrary, there is almost as much variety as in the case of the achorion. Smooth-margined mycelial threads predominate, and there are very few jointed ones. The smooth-bordered ones are either very small, with nuclei interspersed at regular intervals, and have a single contour, or they are of wider calibre, and have a double contour, either for their whole length, or only for some distance. Many threads at different parts of their course, show alterations in shape and contour of the most varied character. A thread which has been of small calibre for some distance will enlarge at one part into a body which is of variable

breadth, bulging out here and there, and budding out, as it were, just as we see in the achorion. A singly contoured mycelial thread may become doubly contoured during its course.

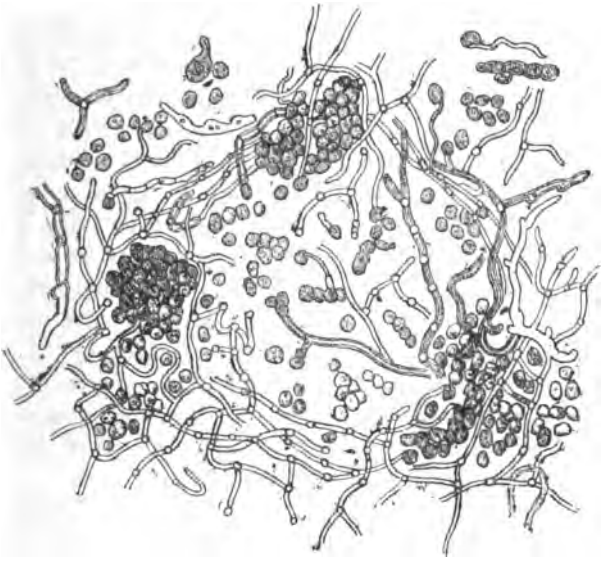


FIG. 12.—Fungus from pityriasis versicolor (*Microsporon furfur*). Hartnack, oc. 3, obj. 9 à immersion (about 700 diam.).

The gonidia are, on the average, larger than in the trichophyton, and remarkably uniform in size. Most of them are irregularly circular in shape. They are grouped together, for the most part, in heaps of thirty or more. These heaps of gonidia are placed at tolerably regular distances from one another, and are joined together by a network of mycelium, the threads of which seem, partly, to ramify amongst the groups of gonidia, and, partly, to be connected with the gonidia cells themselves. This peculiar grouping of the gonidia and of the mycelium gives the fungus of pityriasis versicolor quite a characteristic and original appearance, differing distinctly from that of favus and ringworm. Some of these groups appear to be connected to the mycelial threads, like umbels to the flower stalks. And appearances, here and there, as in the centre of Fig. 12, would lead one to conclude that the groups of gonida are, really, outgrowths from the separate threads. At the spot mentioned, there are three gonidia at the end of a thread, whilst a lateral off-

shoot of the same thread has thrown off two gonidia as if by a process of strangulation. In addition, there are isolated and particulary large gonidia, such as the nucleated ones at the upper part of Fig. 12, which have themselves thrown off fresh buds or threads.

The Microsporon furfur is situated in the most superficial layers of the epidermis and is very abundant in the spots of pityriasis versicolor. It is only necessary to soak any epidermic scales which have been removed in glycerine for a short time, to clear the specimen, or to treat them with acetic acid, solution of potash, or even merely water, in order to demonstrate under the microscope the characteristic, highly refracting spherical groups of gonidia. The dark colour of the patches of pityriasis versicolor appears to be due, entirely, to the presence of the mycelial network and groups of gonidia. This is shown by the fact that when the loosened epidermis is removed, the brown spots also disappear, and, further, by the absence of any perceptible pigment in these superficial epidermic lamellæ. The yellowish-brown pigment which produces the pigmentary abnormalities (chloasma, nævus) is situated in the cells of the deepest layers of the rete, in the form of granules.

Gudden (l. c.) says that he has traced the elements of the microsporon within the funnel-shaped prolongations which the epidermis sends down into the hair follicles, and which are continued on to the sheaths of the hairs. This would explain the recurrence of the disease when the epidermis has only been very superficially removed, and, also, the fact that the first appearance of recurrence is noticed around the hairs, at their exit from the follicles.

Development—Course—Mode of Occurrence.

As regards the development and the course of pityriasis versicolor, there is very little that is certain to be said. It would seem that the process invariably begins in the form of small spots, or points, surrounding the hair follicles, and enlarging in size, partly, by peripheral extension, and, partly, by co-ordination. Its progress is exceedingly slow. Often, even after the lapse of months, we can scarcely notice any decided change in the form or size of the separate patches of pityriasis versicolor. This applies, especially, to the large plâques on the trunk, and to the yellowish-brown, or sometimes greenish-coloured discs of pityriasis, convex below, and well defined, met with on the inner surfaces of the thighs, for they remain unaltered,

in some cases, for ten or twenty years. It is, therefore, quite a mistake to assert, as some authors have done, that pityriasis versicolor may develop acutely, as it were, and disappear again, owing to some external or mental influence—taking warm, salt, acid food, drinking cold water while the body is heated, and the like.

Yet a retrogression of the pityriasis versicolor may be shown to occur at any time. But it happens, in accordance with the tedious progress of the disease as a whole, very slowly. An individual may have many patches at one time, and then, after the lapse of many months, somewhat fewer spots, and the process alternates in this way in intensity and extent of diffusion, after the lapse of long periods. Moreover, that a complete involution of pityriasis versicolor may occur is to be gathered, as Hebra has already shown, from the circumstance that we never meet with it in old persons.

Pityriasis versicolor occurs, exclusively, at the middle period of life, from puberty to the greatest maturity. It is neither met with in children, nor in the old, whilst tinea tonsurans may be encountered at all ages. It is much commoner in men, than in women.

Etiology.

The proximate cause of pityriasis versicolor is the fungus peculiar to it. This gives rise not only to the brown discoloration, but, also, to the loosening and desquamation of the epidermis infiltrated by it, and, also, occasionally, to slight hyperæmia (redness) of the papillary layers corresponding to the areas where the fungus is growing.

What predisposing causes, however, there may be which have a special influence on the origin of the disease, it is difficult to say.

That the affection, as a mycosis, should be contagious, and, therefore, should arise mostly from transmission, like tinea tonsurans, is, of course, to be expected *à priori*, but is very difficult to prove clinically. It is true that some authors (Anderson, l. c.) have published cases in which it was probable that married people, and members of the same family sleeping with one another have communicated pityriasis versicolor to one another. But, owing to the very slow and insensible development of the disease, already mentioned, such contagion can hardly be demonstrated with certainty, and reports based on external coincidences are of no conclusive value. Of just as little value, is Hutchinson's surmise, that in a case of pityriasis

versicolor, the disease had arisen by contagion from another patient affected with ringworm.[1]

The statement of Köbner, that he has inoculated pityriasis versicolor on himself is much more valuable in the way of demonstration. But this positive experiment only teaches that the *Microsporon furfur* is inoculable, and does not show that pityriasis versicolor arises by contagion in the ordinary way, apart from experimental inoculation.

On the contrary, it must be borne in mind that, so far as observation goes, this mycosis is transmitted to other individuals with very great difficulty, for a husband may have it for many years, and yet may not communicate it to his wife, and *vice versâ*.

I should be rather inclined to consider that a special predisposition of the skin for this particular parasite was the remote cause, without denying, however, that any skin whatever might become affected with pityriasis. But, that persons with somewhat dry skins, wanting in pliability, and covered with dried sebum (seborrhœa sicca), are more often affected with pityriasis than others, seems to be quite certain, and that the affection usually subsides when the skin is nourished better, and has become softer.

That faulty diet, mental excitement, &c., mentioned by certain of the older and modern writers (Fuchs, Er. Wilson, &c.) as exciting causes of pityriasis versicolor, cannot possibly have any influence, whatever, will be evident from what has been said as to the essential character of the disease.

Diagnosis.

The characters of pityriasis versicolor described above are so unmistakeable and simple that it is scarcely possible, if the least care is taken, to confound the disease with any other affection of the skin. As, owing to the mistakes of authors, and the similarity in colour between pigment spots of all sorts and pityriasis versicolor, they are regarded as very nearly allied, it will be well here, once more, to call attention to the fact that pityriasis versicolor never appears on the face, whilst pigment spots (lentigo, ephelis, chloasma) are very frequently met with there, and that the pityriasis spots desquamate, and can be easily scratched away, neither of which statements applies to pigment spots. It is sometimes difficult to

[1] Hutchinson, 'Med. Times and Gazette,' 1859.

distinguish between pityriasis versicolor affecting the inguino-femoral region, the side of the chest below the mamma, or the arm-pits, and ringworm affecting the same parts. In the latter, as a rule, the margin is most characteristically affected, the desquamation much more distinct and laminated. In pityriasis versicolor, the whole of the diseased patch, up to the flat margin, is of a uniform tint, the margin, at the most, being but slightly more congested; there is no perceptible scaliness, or if scales are present, they are smaller, like fine bran.

I have often known cases of pityriasis versicolor, when characterised by numerous pale-brown or yellowish-pink spots, of the size of lentils or of the finger-nails, mistaken for roseola syphilitica. The simple test of scratching with the finger-nail would save any one from falling into such an error, for, in pityriasis, a scratch would remove the epidermis, whilst in roseola this would certainly not be the case.

It is quite unnecessary to do more, here, than allude to the fact that, under any circumstances, the most certain aid to diagnosis consists in the microscopic demonstration of the presence of the *Microsporon furfur*.

Treatment.

Patients affected with pityriasis versicolor are induced to come for treatment, as a rule, for cosmetic reasons. Patients cannot well go to public baths with a "spotted" skin, or enter into the matrimonial state. The indications for treatment are precisely the same as in tinea tonsurans maculosa. In both, our aim is to remove the epidermic layers containing the fungus. When discussing the treatment of ringworm, it was stated that this purpose might be fulfilled either quickly and certainly, or more slowly and less surely. The same remark applies to the treatment of pityriasis versicolor. We can cure it with certainty, within ten or fourteen days, if we go through a cycle of inunctions of soft soap or Wilkinson's salve; or we may accomplish our end more slowly by washing with soap, and by the use of parasiticides in the form of ointment or in solution. As these remedies and methods are precisely the same as in tinea tonsurans maculosa, we will refer to the chapter on that disease for further details.

APPENDIX.

ON THE QUESTION OF THE IDENTITY OF THE DERMATOMYCOSES.

In the general introduction to the chapters on the dermatomycoses, I have shown that the idea of the identity of favus and ringworm, and, according to some, of pityriasis also, so far as it is based on botanical and mycological grounds, is untenable, and also that, on the contrary, its present inadmissibility has been demonstrated by professed and scientific mycologists.

It follows, therefore, that the opinion that the mycoses named are identical can only rest on an essential agreement in the clinical symptoms, and must do so.

It must here be noted, in the first place, that pathologists really consider these morbid processes under discussion to be widely separated from one another clinically, and capable of being diagnosed from one another. This shows conclusively that, clinically, the processes do practically differ from one another in their symptoms.

Apart, however, from this "logic of facts," which is unmistakeable and not to be despised, I may point especially to the preceding description of the character, course, mode of appearance, occurrence, effects, and, in short, clinical relations of favus, tinea tonsurans, and pityriasis versicolor—a description based on personal observation, and, I believe, corresponding to the real state of affairs; and I would recommend it to the attentive consideration of students. It will be evident from this (in spite of their agreeing so far that the same cause—the growth of a fungus—produces them all), that there are so many and such essential and fundamental differences, that scarcely any doubt can remain as to the necessity and justness of regarding these morbid processes as clinically specific, even if—as is not the case—they were mycologically identical.

I must content myself here, in reference to the question of identity, with alluding to the preceding detailed account of the clinical characters of each mycosis, as it would be inadvisable

to recapitulate all that has been said with regard to the latter point.

Still, I may be permitted to mention, shortly and comprehensively, some of the more marked differences.

First, as regards favus and ringworm—

Favus produces characteristic accumulations of fungus, "favus individuals," scutula, and is persistently renewed in this form as often as it may be removed, during an existence extending over a period of many years. Tinea tonsurans is reproduced invariably only in the form of scales and rings.

Favus is exceedingly chronic in its course, tedious, exists from fifteen to thirty years, or more, confined to the same, and often a very small, cutaneous region. Tinea tonsurans progresses much more rapidly, never hardly persists so long (weeks, months, a year, or several years), and wanders quickly from region to region, often in acute outbursts, over the whole skin.

Favus is undoubtedly not easily transmitted, and scarcely ever occurs en- or epidemically. Tinea tonsurans is exceedingly contagious, and very often spreads in limited areas, en- or epidemically.

Favus causes but slight outward changes (in colour and lustre) in the hairs, though these are infiltrated with fungus, and yet it leaves behind it cicatricial degeneration of the skin and permanent baldness. Ringworm, on the other hand, whilst its fungus penetrates the root sheaths and the hairs in the same way, causes at a very early period, almost immediately after its entrance, an extreme degeneration of the hair, which breaks off; but ringworm never causes cicatricial atrophy of the skin, or, at any rate, if any is produced, it is very limited, being confined to a very few follicles.

The fungus, in both cases, grows copiously within the follicles. The favus fungus persistently accumulates in typical heaps (scutula) at the mouths of the follicles, whereas the trichophyton spreads superficially into the surrounding epidermis.

Favus, as a rule, attacks the scalp, rarely occurring on parts not hairy, and then quickly disappearing. Ringworm, in the majority of cases, occurs on non-hairy parts, and here persists very frequently for many years, and, on the contrary, is met with comparatively rarely on the scalp.

Favus almost invariably affects very young people. Ringworm occurs very frequently in adults.

Whilst confining myself to contrasting these few, but, undoubtedly, very distinctive features, I will just mention that, in all successful experimental inoculations, and in all demonstrated accidental transmissions of favus, or ringworm, from one individual to another, from man to the lower animals, or from the latter to the former, it has invariably occurred that favus has produced favus, and ringworm, ringworm, as will be seen from the literary and historical data given in the foregoing chapters.

There is one fact, however, which is worthy of note and, as yet, unexplained, that of the occurrence of ringworm forms in idiopathic and artificially inoculated favus.

Without being able to offer any explanation, I may here allude to the fact that the most varied forms of fungi, whether accidentally or purposely inoculated, have produced the tinea tonsurans forms, and that, therefore, it would appear as if, in a general way, most of the fungi—with one undoubted exception (*Microsporon furfur*)—which take root in the epidermis, grow in it for a longer or shorter period in a centrifugal direction, and, therefore, may give rise to annular forms of disease. This is a point worthy of further consideration by the profession.

Lastly, with regard to pityriasis versicolor, it will be sufficient to refer to the previous description of the disease in order to demonstrate its specificity, which is admitted by all practical pathologists, and the points wherein it differs from favus and tinea tonsurans.

And, though theoretical speculation may lead many to believe in the identity of the mycoses named, students and practitioners will avoid error, solely, by regarding favus, ringworm, and pityriasis versicolor as distinct maladies, from a clinical point of view.

I cannot close my remarks on the dermatomycoses without alluding to a few special affections in which a fungus has been shown to be present, but which I cannot place as parasitic affections on the same level as the three mycoses described; partly because the demonstrations of the presence of the fungus have only been isolated, and, partly, because the relation of the fungus to the skin disease has not been established with any certainty.

In the first place, I must mention the malady described by various authors as "Madura foot" ("Madura-Bein," "Podelkoma," "Mycetoma," "Morbus tuberculosus pedis"). It merely consists, in my opinion, of an elephantiasis arabum cruris, set up by chronic inflammation (eczema, varices, caries, and necrosis of the bones,

&c.) According to Dr. Carter, cavities are formed in the bones and in the hypertrophied homogeneous soft parts. In these, our author has found a fungus (in dark-brown microscopic heaps) which he has described,[1] and which Berkeley has more closely examined and named *Chionyphe Carteri*,[2] after the discoverer.

As the fungus has not been shown to be the cause of the disease, we cannot, at present, regard it as parasitic, and we merely mention it because it has been classed by Fox among the dermatomycoses.[3]

In the next place, I must allude to the impetigo contagiosa of Fox,[4] vel impetigo parasitaria mihi.[5]

In the year 1871 ('Med. Presse'), I described the characters of this disease, and I also described and figured a fungus, provided with organs of fructification, which I found in the epidermic covering of the vesicles met with in this disease.

This discovery has since been substantiated in many quarters, but has also been disputed in others. Whilst writing this chapter, a publication has just appeared from the pen of Geber,[6] in which he states he has found (and figured) precisely the same fungus, that is, having the same organs of fructification, that I described.

Geber comes to the conclusion that this fructifying fungus, like the puccinia favi, is only met with accidentally in the epidermis, and, also, that this impetigo is only a variety of ringworm, because, in a second case, in addition to the impetigo, he also found rings of tinea tonsurans. In the latter case, however, he did not find any fructification forms, but merely mycelial threads.

Geber's conclusions do not seem to me sufficiently well founded to make me at once agree with him. I prefer, for the present, to insist on the fact that this impetigo, as described by me at the time, presents special clinical features, and that, now, a second observer has seen the same fructifying fungus in this vesicular disease which I described in the year 1871.

For reasons, however, which I will state elsewhere,[7] I cannot say

[1] 'Transactions of the Medical and Physical Society of Bombay,' 1860.

[2] 'Intellectual Observer,' November, 1862.

[3] Fox, 'Skin Diseases of Parasitic Origin,' p. 15, and plate iv, fig. 5.

[4] 'On Impetigo Contagiosa or Porrigo,' London, 1864.

[5] 'Wr. med. Presse,' 1871.

[6] Geber, "Ueber das Wesen der Impetigo contagiosa," Fox, "oder parasitaria," Kaposi; 'Wiener med. Presse,' 1876, No. 23 und 24.

[7] I will take an opportunity to express my views in detail in regard to this process, and also erythema iris, in another place.

any more as to the definite relationship of this process to the recognised mycoses, than I did five years ago.

Lastly, I have to remark that I do not class erythema iris among the parasitic processes, though I demonstrated the presence of mycelium in that disease in the year 1871.[1] I impose this limitation on myself, because this discovery remains an isolated one, and has not been confirmed by any one else. Further than this I can only hope that, as my discovery in regard to impetigo has been confirmed by Geber, so, also, that in regard to erythema iris may, some time, be substantiated by others. That Pick[2] has not as yet done this I regret; but, as he has found nothing, I do not agree with him that he is logically justified in disregarding "everything relating to the discovery of fungus in this disease." My discovery was and remains a positive fact which cannot be altered by the negative results of others.

On the other hand, I am sufficiently objectively inclined to say that, even if such discoveries be repeated, as regards the relationship of erythema iris to the processes allied to it clinically, there is still much, very much, to be cleared up, and that so long as all the influences at work are not explained, I shall still continue to regard erythema multiforme, and the processes allied to it, from a clinical standpoint.

As regards the well-known occurrence of mould fungus (*Aspergillus*) in the external meatus of the ear and on the membrana tympani, I need only remark that it is not within the scope of our present purpose to discuss it here, for it has no connection with diseases of the skin.

[1] "Zur Ætiologie des Erythema multiforme und Herpes iris, sowie zur Frage über die Identität der die Mycosen bedingenden Pilze," 'Arch. f. Derm. und Syph.,' 1871, 3 H., p. 381—396.

[2] Pick, "Ueber das Erythema multiforme," 'Prager med. Wochenschrift,' 1875, No. 20.

DISEASES OF THE SKIN CAUSED BY ANIMAL PARASITES.

The diseases of the skin excited by animal parasites, like the dermatomycoses, have to be considered from a twofold aspect; on the one hand, there is the parasite, which we have to describe, *per se*, as a substantive object of natural history apart from the human organism, and, also, the circumstances connected with its mode of life (dwelling, nutrition, propagation); and, on the other hand, there are the pathological changes which the animal causes directly or indirectly in the human skin.

Any preliminary general remarks will not be so advantageous in the case of the animal parasites as in regard to the Dermatophytæ. For the former do not present the same analogies amongst themselves, as is the case with the latter, but are distinct in their essential character and in their action on the skin, and the more so, as, even in the lower animals, the individuality is more developed than in the lower plants.

With our description of the skin diseases caused by the animal parasites, we must, therefore, combine an account of the individual parasites, without making any general introductory remarks.

The animal parasites which most frequently produce typically morbid appearances on the human skin either

(1) dwell in the skin (exclusively or only for a time)—Dermatozoa; or,

(2) only seek their food on the skin, and live either between the hairs, or in the clothes, or some other extrinsic position—Epizoa.

In the first category, we have—

(*a*) The itch-mite—*Acarus scabiei.*

(*b*) The *Acarus folliculorum.*

(*c*) The sand flea—*Pulex penetrans.*

(*d*) The Guinea-worm—*Filaria medinensis.*

(*e*) The harvest bug—*Leptus autumnalis.*

(*f*) The common wood or dog tick—*Ixodes ricinus.*

In addition to these may also be mentioned, as of more accidental occurrence, the itch-mite of birds (fowls), *Dermanyssus avium*, and

many itch-mites of the domestic mammalia—Dermatodectes and Symbiotes.[1]

In the second category, we have—

(*a*) Pediculi, and of these—

(*α*) The head louse—*Pediculus humanus capitis.*

(*β*) The crab louse—*Pediculus pubis.*

(*γ*) The clothes' louse—*Pediculus vestimentorum.*

(*b*) The flea—*Pulex irritans.*

(*c*) The bug—*Cimex lectularius.*

(*d*) The gnat—*Culex pipiens.*

These parasites may give rise to skin diseases directly, by exciting symptoms of inflammation (hyperæmia, exudation, an eruption, hæmorrhage, degeneration, thickening of the epidermis or of the nail substance) at the very point where they grip the skin, wound, irritate, disturb the epidermis, or bury themselves; or, indirectly, by exciting a sense of itching and burning, and thus causing the patient to scratch, the result being, partly, a mechanical injury to the skin, and, partly, the production of symptoms of inflammation.

The severity and the nature of the skin disease are directly proportionate to the injurious influence exercised by the animal parasite on the skin. The more lasting and continuous the injurious influence (and it is especially marked in the case of some of the Dermatozoa), the more severe and regular is the outbreak of the skin affection.

Though the skin diseases caused by animal parasites do not show any symptoms differing essentially from the ordinary ones of hyperæmia, hæmorrhage, exudation, formation of papules, vesicles, and pustules, hæmorrhage into, and pigmentation and thickening of, the epidermis, thickening and degeneration of the nails, &c.—yet, to some extent, each presents to our notice very specific and particularly characteristic typical features derived from the grouping, localisation, intensity, and duration, according to the particular etiological influence at work. This circumstance renders it necessary that each of the Dermato- and Epizoa named should be described separately in connection with the corresponding pathological changes in the skin.

[1] See 'Descriptive Catalogue of New Syd. Society's Atlas of Skin Diseases,' part ii, p. 83, pls. 1, 2, 3 and 4 (TR.).

I. DERMATOZOA, AND THE SKIN DISEASES CAUSED BY THEM.

DERMATOZOONOSES.

The Itch-mite. Acarus scabiei, Sarcoptes hominis.

The disease known as the itch, scabies, is made up of two sets of symptoms: those which the acarus excites directly, by its growth within the epidermic strata, at the particular point where it may sojourn, and those which arise indirectly, in consequence of the cutaneous irritation, the itching and scratching, excited by the acarus.

The latter symptoms, *sensu stricto*, represent an artificial eczema, such as is commonly developed after cutaneous irritation of any other sort. But they receive a peculiar character from the typical localisation of the injurious agent at work here—the *Acarus scabiei*.

We certainly must not undervalue the grounds which led Hebra to treat of scabies under the head of eczema. But, at the same time, attention must also be paid to the agent which impresses on the artificial eczema its peculiar character, that is, the *Acarus scabiei*, and its natural history. For, a proper understanding of the series of symptoms first named, which are caused directly by the acarus, and which must be present in combination with those of the artificial eczema to produce the typical clinical features of scabies, can only be attained by studying at the same time, as accurately as possible, the natural history of the Acarus, its mode of life, habitation, &c.

At page 164, *et sequ.*, vol. ii,[1] and in his 'Atlas' (5 Lief, p. 1, *et sequ.*) Hebra has given a thorough account of the history of scabies, and of the intimately related natural history of the acarus.

It only remains, therefore, for me to refer to the account there given, and to add illustrations of the objects there described.[2]

[1] In the second German edition some further details are added.

[2] The illustrations of the *Acarus scabiei* and the burrows are drawn by Elfinger's masterly hand, and are taken from 'Hebra's Atlas,' l. c. In the recent article by Bergh ('Vierteljahrschrift f. Dermatol. und Syph.,' 1874,

For greater convenience of comprehension, the description of the

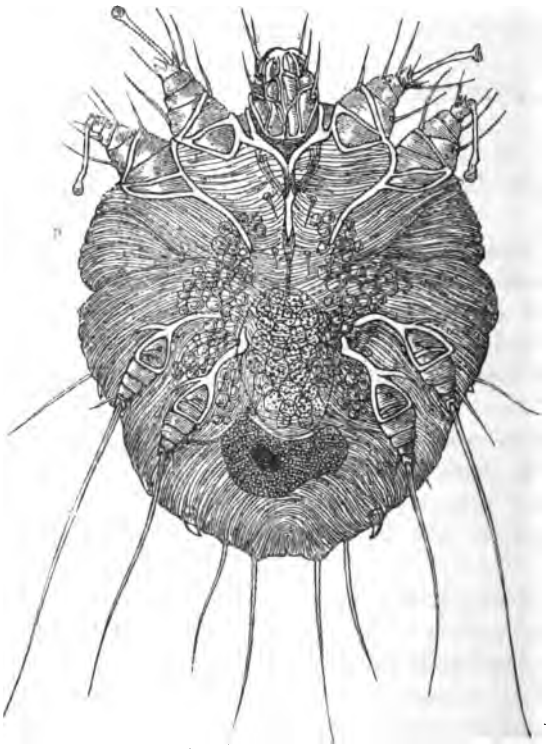


FIG. 13.—Mature, pregnant female acarus. Ventral aspect. Magnified about 300 diams. We can see the parts of the body described above very distinctly and thoroughly. In the interior of the abdominal cavity, there is a mature ovum ready to make its escape. In reference to the median coxal process (Huftleiste), situated in the middle line and connected with the first pair of legs, Bergh finds there are characteristic differences in the male, female, and immature Acari.

general characters of the human *Acarus scabiei*, given in the second edition of the first part of this work (see p. 195, vol. ii, present work) is repeated here. "Body oval, tortoise-shaped, with indenta-

4 H.) "On Scabies Crustosa" (Borkenkrätze), certain unessential points are differently given, more especially in regard to the male organs of generation. As, however, in regard to the latter, Gudden's sketch, again, differs somewhat from Bergh's, it will sufficiently answer our purpose in this text-book to follow Hebra.

tions in the lateral margins. Skin provided with shallow, wavy, transverse furrows (Rillen). Dorsum covered with numerous small and large appendages of a clavate or conical form, or resembling

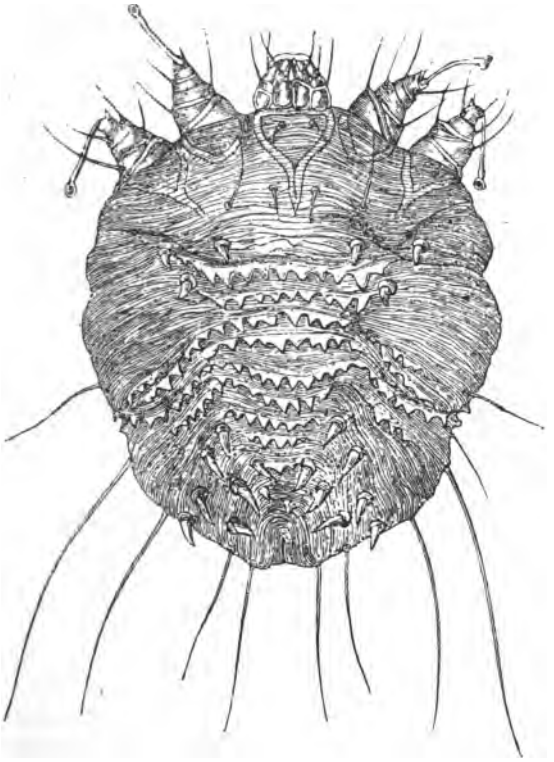


FIG. 14.—Mature female acarus. Dorsal aspect. At the posterior part of the dorsum are fourteen thorn-like spines. For the number and situation of the bristles and spines, see the text, and also Bergh, l. c., p. 514, *et sequ.*[1]

[1] Bergh, l. c., p. 514, says, "At the nape of the neck, there is a pair of short, strong, stiff, pointed, cervical, thorn-like spines." Further backwards may be seen the spectacle-like organ. On the dorsal aspect of the acarus, behind the base of the outer anterior legs, are the long shoulder-bristles. Behind these, are the 33 shoulder-cones, forming a triangle, with the apex directed backwards. Behind these, the dorsum is covered with scales and clavate processes arranged in transverse lines. On the posterior surface of the most posterior part, are the strong dorsal spines, arranged in four longitudinal rows, and, in the old (mature) acarus with eight legs, fourteen in number.

scales, and with spines resting on papillary elevations. Head distinct from the body, provided with four jaws superimposed in pairs, and two strong three-jointed palpi placed near them, and equal to them in length. Legs, eight in number, with five joints; the first and second pairs having suckers with stalks, the latter being of the same length as the feet, and unjointed; the third

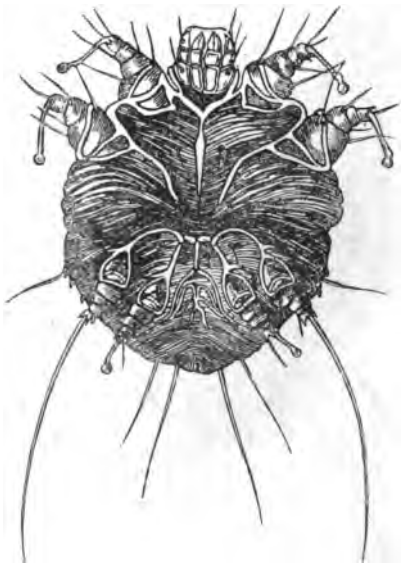


FIG. 15.—Male acarus. It is distinguished from the female by its much smaller size (on the average 0·235 mm. (·009 inch) in length, and 0·19 mm (·0065 inch) in breadth), by the smaller number of dorsal spines, by the presence of suckers instead of bristles on the fourth pair of legs, and by the horseshoe-shaped chitinous framework situated between the posterior pair of legs in the middle line of the body, and in which the forked penis is sunk, as in a groove.

and fourth pairs, in the female (Fig. 13), ending in long bristles. In males (Fig. 15), the first, second, and fourth pairs have suckers, and the third have bristles; epimeri of the first pair of legs blended together. Larva (Fig. 16) has six legs, the first and second pairs ending in suckers, and the third in long bristles." The Acari change their skins three times before they are fully developed (see Figs. 20 and 21). They mostly live in the burrows (see Fig. 17) which they excavate in the human epidermis, but they may also be found beneath the epidermis, without their having formed any burrows, in

scabies crustosa, s. norvegica (Fig. 19), and in the latter disease they also occur in the substance of the nails.[1]

In scabies crustosa (scabies norvegica, Boeckii, Hebra), in the human subject (and in scabies in the lower animals), the Acari are not situated in regularly placed burrows, but irregularly between

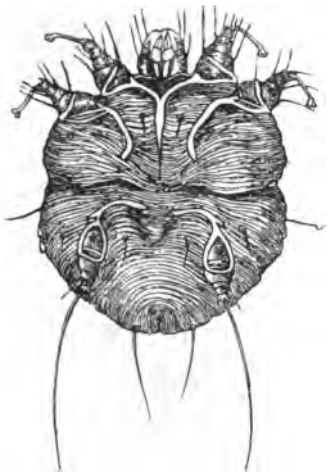


FIG. 16.—Larval acarus, with only six legs and comparatively few bristles.[2]

the layers of the epidermis, so that young and old Acari, males and females, in various stages of development and moulting, ova, skins of Acari and egg shells, fragments of Acari and of skeletons of Acari, and fæcal masses, may all be seen in irregular juxtaposition, the living, however, being always situated in the deeper and more succulent layers of epidermis (Fig. 19, and Hebra, 'Ueber die in Norwegen beobachtete neue Form der Krätze,' Wien, 1852.)

That the Acari undergo three moults has been already mentioned.

In Fig. 20, the first moulting is represented, and in Fig. 21, the second.

In reference to the detailed changes taking place during the three

[1] I myself possess preparations of Acari, which were obtained from a nail, in Hebra's possession, taken from a case of scabies crustosa. See on this matter, Bergh, l. c., p. 570.

[2] In regard to the number and the situation of the bristles, see Bergh, 'Vierteljahrschrift f. Dermat. und. Syph.,' 1874, p. 519.

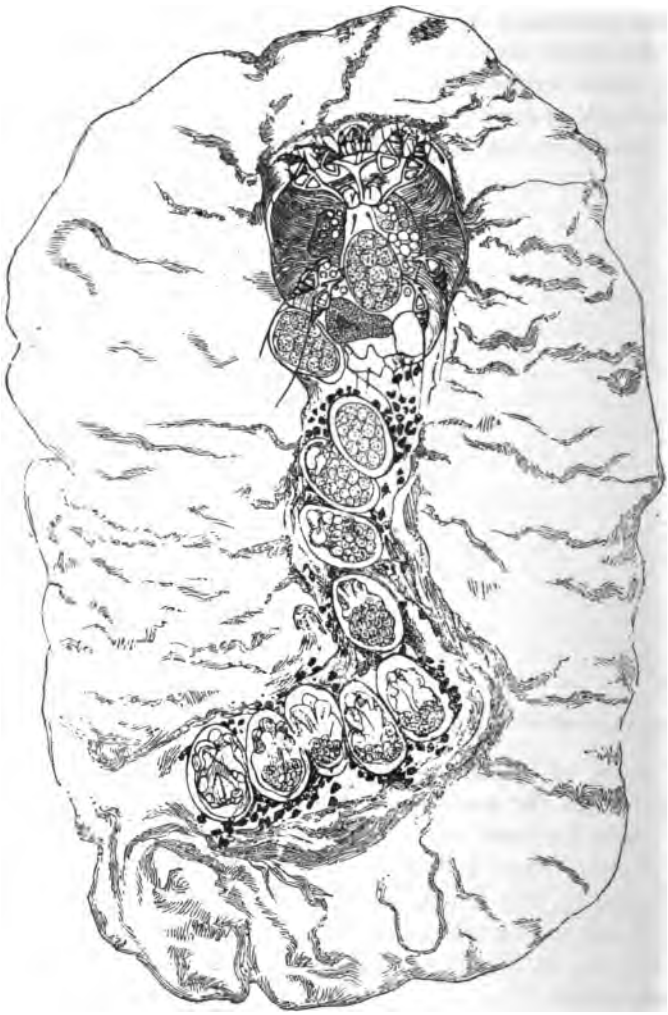


FIG. 17.—A burrow formed by an acarus within the epidermis, containing a female acarus with the head directed to the blind end of the burrow. In the acarus is an ovum. Behind the acarus, and in a row one after the other, with their long axes placed transversely to the long axis of the the burrow, there are ten ova. In the three youngest of these, the contents have already undergone subdivision. From the fourth to the tenth, the progressive development of the young Acari, in relation to the age, may be seen, beginning at the head, and, at the tenth ovum, the development is almost complete. Between the ova of the Acari are black, irregularly-shaped fæcal masses.

moultings, Bergh speaks as follows in his latest article.[1] The young leaves the ovum (first stage) with only one pair of legs behind, and with only two (the longest) inner anal bristles; on the dorsum, there are but ten dorsal spines. Within this form, there is developed the eight-legged young one (second stage—first moulting), which is set free by the skin rupturing, mostly along the abdominal aspect. The young at this stage show four anal bristles and twelve dorsal spines. Within the skin of this form, there is developed the last immature one (third stage—second moulting), which only differs essentially from the foregoing inasmuch as it has fourteen dorsal spines. Within the skin of this form, is developed the adult acarus (third moulting).[2]

FIG. 18.—An ovum. Magnified 200 diam. The eggshell and the yolk-globules can be seen.

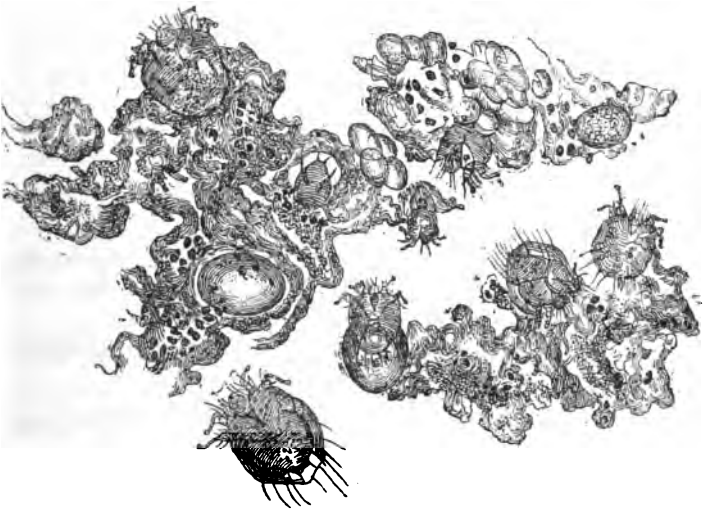


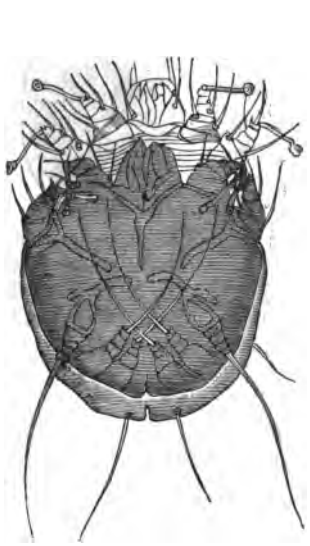
FIG. 19.—Scabies crustosa.

For details as to the *Acarus scabiei* and its life history, I would again refer to the chapter on "Scabies" in vol. ii, p. 195, of the

[1] 'Vierteljahrschrift für Dermat. u. Syph.,' 1875, 4 Bg., p. 520.

[2] Bergh (l. c., p. 520, note from p. 519) mentions that in two cases in adult

present work, and to the older works there quoted, namely, those of Bourguignon, Gudden, and Fürstenberg, and in addition, in



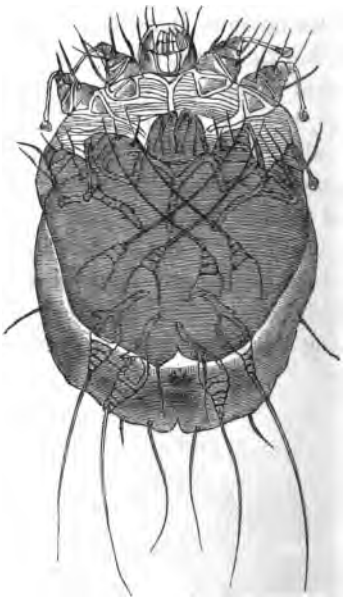


FIG. 20.—First moulting. We see within a young, and, therefore, six-legged acarus, a second one, with two pairs of legs posteriorly, and, therefore having eight legs.

FIG. 21.—Second moulting. Within an eight-legged shell of an acarus can be seen a new one developing, which has also eight legs.

modern times, to the article by Kraemer[1], and particularly to the article by Bergh just quoted, in which very interesting observations will be found, partly supplementing and partly rectifying earlier statements in regard to particular parts of the body, especially the shape of the thoracic (chitinous) processes (Brustleisten) in males, females, and young, the male genitals, the number and situation of the bristles, as well as many other matters concerning the natural history.

males and females he saw a fourth moulting. See, on this subject, the account by Fürstenberg and Gudden (l. c.), and the chapter on "Scabies," in vol. ii of the present work.

[1] Kraemer, "Wer ist der Entdecker des Krätzmilbenmännchens," &c., 'Virch. Arch.,' 1872, 55 B., p. 330-354, und Taf. xviii.

THE ACARUS FOLLICULORUM.[1]

The *Acarus folliculorum* was discovered in 1842[2] by that most indefatigable investigator in relation to the skin and its changes, G. Simon, whilst examining the contents of the hair sacs and sebaceous glands (in the living, and after death), in his prosecution of his study of acne. Henle[3] had just before made the same discovery and recorded it, but he had certainly not arrived at any clear views as to its nature, &c., and, later,[4] acknowledged the identity of what he had seen with that which G. Simon has described.

Since that time, the *Acarus folliculorum* has been repeatedly seen and described in essentially the same way as by G. Simon, by Miescher, Valentin, Er. Wilson, Gruby, Siebold, Remak, Wedl, Küchenmeister, Bärensprung, &c.

The *Acarus folliculorum*[5] (Fig. 22) varies much in length. Most commonly, it has a length of from 0·085—0·125 of a line, and a breadth of about 0·020 of a line (see Fig. 22, A).

The head consists of two, two-jointed palpi, one on either side, and a tubular proboscis, on which is situated a triangular organ, consisting of two, fine, pointed processes, or bristles.

The head is continuous with the thorax, which forms about one fourth of the whole length of the animal. On either side of the thorax, there are four very short conical feet, consisting of three seg-

[1] *Acarus folliculorum*, G. Simon; *Demodex folliculorum*, Owen; *Macrogaster platopus*, Miescher; *Simonea folliculorum*, P. Gervais; *Steazoon folliculorum*, Er. Wilson.

[2] 'Medicinische Zeitung vom Vereine für Heilkunde im Preussen,' 1842, No. 9; und G. Simon, 'Die Hautkrankheiten,' Berlin, 1851, p. 212.

[3] "Bericht über die Züricher naturforschende Gesellschaft," im 'Beobachter aus der östlichen Schweitz,' December, 1841.

[4] Henle und Pfeuffer's 'Zeitschrift für rationelle Medicin, 1844, III Bd., 1 H., p. 28.

[5] See the illustration and description given by G. Simon, l. c., Taf vii, fig. 6 bis 9, und p. 313 *et sequ.*; by Wedl, l. c., p. 803 und fig. 197; Küchenmeister, l. c., Taf. viii, fig. 14, 15, 16. In my description, I follow this author.

ments and apparently furnished at the extremity with three thin claws (Miescher was of opinion that the two posterior feet had five processes). From the base of each, a ridge (Streifen) passes transversely across the thorax, and these bands are united in the middle line by a longitudinal ridge. The cross ridges appear to pass round the thorax. Miescher regarded them as a framework of horny substance. He also believed he had discovered an anal or sexual fissure behind the last pair of feet.

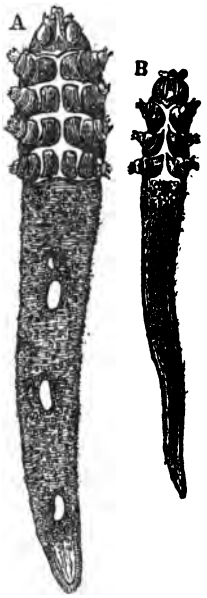


FIG. 22.—*Acarus folliculorum* (after Küchenmeister). A, with eight legs; B, with six legs.

The abdomen is about three times as long as the thorax, and is constricted at intervals, so that it appears furrowed transversely and indented at the margin, like a file. In the interior of the abdomen we find brown or blackish granules, with oil-like granules interspersed. Er. Wilson and Wedl believe they have discovered an œsophagus and intestine, and the former also thinks he has made out a liver.

A second form of *Acarus folliculorum* is met with, which is distinguished from the first by the shortness of the abdomen. A third form (Fig. 22, B) has only three pairs of feet. Erichson regards the latter as the youngest, the one first described as the representative of the second stage of growth of the animal, and the shortest as the oldest form.

A heart-shaped body, which G. Simon (l.c., Taf. 7, fig. 10) regarded as an egg-shell, Wedl has shown to be the young animal, for he has often seen it in the interior of an old one. Wedl (l.c., p. 806) is of opinion that this body leaves its mother through the longitudinal fissure in the thorax, and that a continuous transition may be observed from this youngest form to that of the developmental stages (larval conditions) already mentioned. According to Wedl, it is also probable that the *Acarus folliculorum*, like the *Acarus scabiei*, goes through a moulting process.

These Acari are especially numerous in persons who secrete a

quantity of sebaceous matter, but are also met with in some individuals who have no seborrhœa; in the sebaceous and hair follicles of the skin of the face, nose, lips, brow, cheeks, external auditory meatus, and behind the ear, and, more especially, in the contents of comedones. In the follicles, they are placed, as a rule, with the head inwards, in the mouth of the follicle, and, also, occasionally, near the bottom of the follicle, three or four together. Simon saw from ten to thirteen, sometimes, in one follicle.

We can obtain them for examination by merely squeezing out the contents of the sebaceous glands, and then looking with the microscope after a little oil has been added. Not unfrequently the Acari, when freshly obtained, exhibit tolerably lively movements. If, for some reason or other, we are led to examine epidermic layers from the face, for instance, in the coverings to blebs, we not unfrequently find one or several Acari, or their skins, in the concentrically arranged epidermic layers corresponding to the apertures of the follicles.

The *Acari folliculorum* do not appear to exercise any injurious influence on the human skin. They cannot in any way be regarded as the cause of the acne, the comedones, or the seborrhœa. They very often occur in great numbers in persons who are quite free from acne and seborrhœa, and may be scarce in individuals who are so affected. They must, however, be regarded as tolerably constant parasites of the human skin.

Gruby inoculated the *Acari folliculorum* on a dog, and states[1] that, in the course of two years, the parasite had spread to such an extent that nearly all the follicles were affected by it, and the dog lost nearly all its hair, the epidermis desquamating at the same time. In regard to this statement of Gruby, Wedl and G. Simon remark that he omitted to note whether the animal had any of these Acari before the inoculation was practised.

Sparks[2] has published an account of the occurrence of universal acariasis in three dogs, who all died of marasmus after symptoms of general loss of hair and an eruption resembling acne had been present for a few weeks, and in whom *Acari folliculorum* were found

[1] 'Comptes rendus,' March, 1845, and 'Monthly Journal of Medical Sciences,' 1846.

[2] "On a Disease of the Skin produced by the *Acarus folliculorum*, illustrated by Cases observed in the Dog" ('Med.-Chir. Trans.,' vol. liv), reprint, London, 1874.

in abundance. He was compelled to agree with Mr. Duguid in regarding the *Acari folliculorum* as the cause of the symptoms mentioned, and of the death of the dogs, and it must also be noted that several other dogs were affected by contagion from them.

The precise place of this acarus in a systematic classification has not been determined.

There are certain other Acari which, occasionally, accidentally become located on the human skin, and may excite itching and symptoms of eczema, and of these we may mention:

The acarus of birds, *Dermanyssus avium*, which is about the size of a hemp-seed, very agile, and infests domestic fowls, pigeons, and cage-birds. It passes from the cages, hen-roosts, and dove-cots, on to the persons engaged in them. Itching and papular eczema are thus set up.

The itch Acari of the domestic mammalia, belonging to the class Dermatodectes and Symbiotes,[1] sometimes pass on to the skin of those who have to do with mangy animals (horse, sheep, &c.), and there set up itching and eczema; but they soon die and never burrow. Whenever true scabies is set up in the human subject by transference from a mangy animal, it results from the transference of the *Acarus scabiei* common to man and the lower animals, for it is this alone which forms burrows in the human skin.

Finally, as Bärensprung rightly remarks, we shall not be surprised if, amongst the filth met with in plica polonica, we also occasionally find Acari, as well as other vermin.

PULEX PENETRANS. RHYNCHOPRION PENETRANS. THE SAND FLEA.

The sand flea[2] (Chigoe, &c.) is endemic[3] in Central and Southern America, and is met with between the 29th parallel south of the

[1] Gerlach, 'Krätze und Räude,' mit 8 Taf., Berlin, 1857.

[2] Karsten, in his "Beitrag zur Kenntniss des Rhynchoprion penetrans," 'Virch. Arch.,' 32 B., 1865, p. 269, Taf. viii und ix, gives us very valuable data in regard to this parasite, based on his own observation.

[3] It is not asserted that the African sand-flea, described by Adanson

Equator, in Paraguay, Brazil, &c., and the same parallel in the north, in Mexico, Virginia, and, also, at the Equator (Quito, Bagota), at a height of 6—8000 feet on the Cordilleras. Not only does man frequently harbour the insect and thus contribute to its perpetuation; but, also, in dwellings which he has inhabited, the eggs of the "Nigua" may remain harboured by rats, mice, and similar animals.[1] If, under such circumstances, travellers stay for the night in such habitations, they may easily suffer from the burrowing of the sand fleas.

It is invariably the pregnant female, alone, which burrows under the nail, around the ankle, or in some other favourite part of the skin. The statements of Schwartz, Rengger, Humboldt, &c., to the effect that strangers are more commonly infested with these insects than are the natives, may be explained by the fact that strangers are not sufficiently familiarised with the slight prick caused by the insect when effecting an entrance, to enable them to recognise its significance, and withdraw the insect at once. After entrance has been effected, no abnormal sensation whatever is experienced locally. It is not till after the lapse of some time that inconvenience is experienced, owing to the animal increasing in circumference by the steady development of the ova contained in it. It may then attain the size of a pea.

The male, who travels free on the surface and never burrows, is of a yellowish colour, and never brownish or dark. It is only the pregnant females who burrow. They are white or (owing to the pigment of negroes) grey.

The size of the Chigoe ("Nigua") is equivalent to a mm. (·04″), that is, about half that of a human flea. In the skin they may increase to the size of five mm. (·2″).

When it has burrowed, it causes no annoyance, whatever, beyond the momentary prick, and therefore the spot is not scratched or irritated, or, at any rate, not until the animal begins to swell. Then inflammation, lymphangitis (as Karsten experienced in his own person), the formation of abscess, even gangrene, necrosis of the bones, and tetanus (in negroes) may follow, and some individuals

('Reise nach dem Senegal,' 1757), burrows. It would appear, therefore, according to Karsten, not to belong to the same class as the American one.

[1] Karsten saw a field-mouse from Cuença, in Schmarda's rich collection, whose tail and feet were infested by a number of chigoes ("niguas"), and he has (l. c.) given an illustration.

may even succumb to these symptoms, as we learn from the account given of a monk, who wished to take home to Europe an insect which had burrowed beneath his toe-nail, but who died during the sea voyage.

The enlargement of the animal takes place in from two to five days after it has penetrated. Several animals may then easily burrow in the skin affected by inflammation. This explains the fact that frequently several may be met with together, and the explanation formerly offered that young larvæ crept out from the maternal animal is erroneous. It has been shown that the female only contains and gives birth to eggs, never to larvæ.

The ovary is simply forked. In its cylindrical follicles are contained the ova, the ripest being placed near the cloaca. The cloaca opens into a pouch, into which the duct of the seminal receptacle also opens. It is in this pouch, according to Karsten, that the ovum is impregnated, and remains till it has attained maturity, when it is extruded. When all the ova have been deposited in the surrounding tissues, the mother probably dies, and is thrown off, together with the epidermis covering it.

The plan of treatment adopted by the natives is well known, namely, to remove the animal with a red-hot needle, and to cauterise the wound with tobacco. The animal can be withdrawn after it has been lodged a while, much more easily than immediately after its intrusion, for it only bores more deeply during any attempt at extraction, and the embedded mandibles are very easily broken off, and if left behind are prone to excite inflammation and ulceration. If we wait a day or two it seems paralysed. We can easily then remove the epidermis covering it and extract the globular distended animal in its entirety.

Karsten's statement that the tracheæ of the female during its parasitic life become obliterated for the most part, and do not convey air any more is interesting. But respiration is not on this account by any means wholly prevented. It appears simply to take up nutritious fluid and to assimilate with the greater part of the body, and this view is supported by the retrograde metamorphosis of the digestive tract. But the animal is certainly not wholly deprived of air, and the function of the tracheæ is not in any case quite abolished. For the last respiratory stigma, which opens into the cloaca, is freely exposed to the air, and the stigmata buried in the tissues are not situated in the corium, but only within the

layers of the dried epidermis, where contact with air is still possible.[1]

THE GUINEA-WORM, FILARIA MEDINENSIS.

Dracunculus, Gordus medinensis, Medina worm (Vena medinensis Avicenna) Höllenwurm, Peitschenwurm.

According to Pruner,[2] the original birthplace of this connective-tissue parasite is not to be found in the countries stated by Avicenna, namely, Medina, Egypt, and Chorasan, but in Kerdofan, Sennar, and Darfur, where it is called "Fertit." In addition, however, it is undoubtedly found in West Africa, the Gold Coast, Guinea, Senegal, Medina, and in some of the lower regions of India (Calcutta), Persia, and, much less frequently, on the Arabian coast, whither, as in Egypt, it has been carried by the caravans. In Europe and the New World, imported cases, only, come under our observation.

This parasite is met with in the subcutaneous cellular tissue and between the muscles in almost all parts of the body, in the eye (beneath the conjunctiva, Bajon), and under the tongue, but most commonly it attacks the lower extremities. As many as twenty-eight specimens and more have been observed in one individual. The symptoms produced are; pain, followed by a circumscribed swelling, the formation of bullæ over the same, and the extrusion and appearance externally of a part of the worm; in rare cases, there may be fever, and sometimes even convulsions; fistulæ and subcutaneous burrowing of matter, and even gangrene, may result in cachectic individuals.[3]

The filaria is met with beneath the skin of several of the lower animals (dogs, horses), as well as in the human subject. The

[1] By those who relate instances of "lice living under the skin," and, therefore, of an insect breathing by tracheæ, this explanation by Karsten of the state of affairs as regards the Rhyncoprion is worthy of careful consideration.

[2] 'Die Krankheiten des Orientes,' Erlangen, 1874, p. 250.

[3] Pruner once found a guinea-worm in the corpse of a young negro, behind the liver, between the folds of the mesentery. The posterior part was but slightly altered, and could be easily recognised, the anterior part passed downwards, over the duodenum, as far as the cæcum, in a series of curves ending finally in distinct balls, and was surrounded by an almost cartilaginous nodular mass resembling a capsule.

human parasite is thread shaped. It may attain the length of a mètre (3·28 ft.), or even, according to Rokitansky, of 12 feet. The head is furnished with four hooks in the shape of a cross, whilst the tail tapers off to a point.

Sometimes there is no trace of any inflammatory changes at the seat of its lodgment under the skin. It may then happen that it may be felt coiled up beneath the skin, or it may even be perceptible to the eye, the separate coils lifting up the skin. We can then ascertain, under such circumstances, that it quickly grows, within a few days, from the length of a few lines to that of several inches (Pruner).

As a rule, however, inflammation results in various degrees of severity and diffusion at the part where it is located. There may be produced merely a follicular boil, presenting nothing in the least characteristic. Often there is merely an acne-like pustule at the seat of entrance of the worm. This, or the boil bursts. There escapes a structure not at all unlike the dead core which is so commonly seen. On closer examination it proves to be the thread-like end of the filaria. Or, a larger focus of inflammation may be formed, an abscess, after the bursting of which the worm is exposed to view.

The inflammatory processes named are such as tend to the elimination of the animal. If left alone this occupies many months. Not unfrequently, however, the result of the inflammation set up is to completely encapsule the animal in the subcutaneous tissue by an envelope of indurated tissue formed round about it.

The plan of treatment adopted from of old down to the present time, and still regarded as the most efficient (popular) measure, is to wind the end of the worm extruded from the open abscess, around a stick, and slowly draw out the worm by gradually winding it on the stick. A strong pull must be carefully avoided. If we meet with any resistance (on the part of the animal or of the capsule), we must cease winding. By forcible traction, the animal will be torn across, and it then springs back deeply. To leave behind the piece which has been torn off is regarded as very dangerous to the patient, for the inflammation then increases, and gangrene and pyæmia may result. These consequences may follow. It is also certain, however, that they may not do so, but, on the contrary, no increase of the inflammation may follow, as Lang has shown in the case to be mentioned directly.

Our much regretted and prematurely deceased colleague, Gustav

Lang[1] has left behind him the record of a series of observations on *Filaria medinensis*, partly supporting previous experience, and partly adding to it, which he had the opportunity of carrying out in the case of a Tartar affected with filaria. The man conveyed the parasite in his own person from Turkestan to Pesth, whither he had accompanied the well-known Eastern traveller, Vambéry.

As had been already shown by Jacobson, in Copenhagen, and confirmed by Maisonneuve, Lang also demonstrated afresh, that, from the cephalic end described above, the whole of the worm appears to consist of an envelope, which, according to Lang, is structureless (without muscles), but, nevertheless, like sarcode, contractile, and which is filled with millions of young, very lively animals. If the thread is torn, these young ones tumble out in large numbers, and the worm collapses to an insignificant size.

The movements of these asexual little ones, escaped from the ruptured abdomen of the parent, were so lively, writes Lang, that he could scarcely keep one in the field of the microscope under a high magnifying power sufficiently long. "The body, 0·5—0·6 mm. (·02″—·024″) in length, and 0·02 mm. (·0008″) in breadth, commences with a rounded cephalic extremity, unprovided with any manducatory apparatus or sucking apparatus, but having simply an opening, and continued without any line of demarcation into the cylindrical abdomen. For about two thirds of its length the body remains of a uniform diameter, from thence onwards, however, it diminishes rapidly to an extremely fine tail; at the junction of the two parts of the body mentioned is the anal aperture."

Within the external, finely annulated investment, Lang distinctly saw an intestinal canal, but no sensory, circulatory, or sexual organs, or nervous system.

The young ones are tolerably tenacious of life. In glycerine, acetic acid, &c., they do not die for some twelve hours, in alkalies, rather earlier. Lang kept them alive for six days in bog water, and, according to M. Clellan, they may be revived by moisture even when they have been dried up in their mother's abdomen.

As to the manner in which the animal becomes lodged in the subcutaneous cellular tissue of man (and of some of the lower animals) various opinions are held. Some believe that the worm

[1] Gustav Lang, "Ein Fall von Filaria medinensis," 'Wiener Med. Woch.,' 1864, No. 50, 51, und 52.

found in the sand burrows into the skin of individuals who go about with bare feet. On the other hand, it must be noted that the animals when dried up are incapable of motion, and therefore, if found in the sand, could not burrow into the skin. Others are of opinion that the burrowing occurs during bathing in water (bog water) containing the young Filariæ. It has, however, been shown conclusively that some of the individuals affected have never bathed at all during the period within which they might have become infected. The natives of Senegal and other regions infested by the Filariæ firmly believe that it is only by drinking particular waters that any one becomes affected with the worm, and that, therefore, it is only through the digestive tract that it invades the organism, and this would appear to be the only justifiable hypothesis, for it is the only one founded on a scientific basis.

For, the living asexual Filariæ removed from the human body are incapable, as such, when again taken up into the body, of developing into maternal animals. To obtain this capacity, the animals must develop external to the human organism into male and female individuals. How this development takes place, and what the completely developed individuals are like are not as yet known either from experience or experimentally.

We can, therefore, only suppose that the mature animals, like other helmintha (Cestoideæ, Trichina, &c.), reach the intestinal tract in the first place in the act of drinking, and thence wander along the vessels into other organs and the subcutaneous cellular tissue. They are found, in agreement with this supposition, for the most part, in the neighbourhood of the larger vascular trunks.

Arrived in the human organism, the worm appears only to pursue its wanderings when the further development of the young favours this. The period of its continuance within the intestinal tract varies from five to fourteen months, according to the cases hitherto carefully analysed as to this point. In the case of the Tartar observed by Lang, the extrusion of the filaria occurred just one year after his sojourn in Bokhara.[1]

[1] According to the statements of the Tartar in question, Lang says that the part of Bokhara infested with the filaria is limited to the region between Bokhara and Samarkund, which is watered by the river Kowan and its tributaries. The southern adjoining district of Karchi and the northern districts have no Filariæ.

As regards the treatment of filaria, it has been already mentioned that the most efficient is that of gradually withdrawing the worm by winding it on a small cylinder of wood. We may in this way withdraw the worm in the course of ten or fourteen hours. If it is torn across, the swarms of young ones escaping into the cellular tissue will act, for the most part, as foreign bodies in exciting inflammation. But we cannot regard this occurrence as having by any means the fearful consequences hitherto attributed to it, for Lang has been able to prove the absence of any reaction. An attempt is made to seize a fresh portion, and if this fails, parasiticides are injected (lime or chlorine water, solution of carbolic acid, &c.), with the view of destroying the young brood, and then simple surgical measures are employed, cataplasmata, opening of abscesses, irrigation, &c.

THE HARVEST BUG, LEPTUS AUTUMNALIS.

The harvest bug, *Leptus autumnalis,* is an acarus which can easily be recognised by the naked eye, is of a reddish or reddish-yellow colour, has six legs, and has two eyes and two labial palpi

FIG. 23.—*Leptus autumnalis* (after Küchenmeister).

on the head. The illustration (Fig. 23) is reproduced from Küchenmeister (l. c. Taf. ix, fig. 8), after Professor Leuckart. Von Siebold is of opinion that this acarus is only the larval condition of an acarus possessing eight legs after moulting. According to Schmarda,[1] it represents the larva of *Trombidium autumnale,* an acarus (Laufmilbe) belonging to the seventh family (Trombidiidæ).

[1] Schmarda, 'Zoologie,' Wien, 1872, 2 Band.

It is certain that the *Leptus autumnalis* cannot propagate in the human skin, and only lodges there for a few days, for it soon dies, and no sexual organs can be discovered in it. The most detailed communications on the subject of the harvest bug come from Jahn,[1] also from Gudden,[2] Krämer,[3] and Küchenmeister.

The harvest bugs are met with in autumn in large numbers on dry grass, on ripe corn, and on gooseberry bushes, and it would seem also on the vine and sambucus (Krämer). They also infest several other kinds of plants (room flowers), and even animals.[3] Küchenmeister says that we may easily obtain plenty of them by holding a piece of white paper under a gooseberry bush containing them, and then giving the bush a shake.

It is almost exclusively in the months of July and August that the harvest bugs are found on the human subject. They excite a very irritable eruption, consisting of small red papules and urticarious wheals; according to Gudden, not simply mechanically, but also in consequence of the secretion from their peculiar poisonous glands. Owing to the various sources mentioned from which the harvest bugs may be derived, the disease is known as the harvest eruption, gooseberry disease, vindemia (France) of the vine dressers.[4]

The harvest bug does not bore deeply, and owing to its red colour can easily be seen in the centre of the papules in the skin and may be picked out with a needle. It is generally very active. We may find several of them together in clumps, or arranged like a necklace.

As the acarus does not live in the human skin more than a few days, the itching eruption caused by it is of short duration. The itching is relieved by cold compresses, douching, or spirit lotions. It is better, however, to kill the acarus at the same time by means

[1] Jahn, "Die Stachelbeerkrankheit.," 'Jena'sche Annalen,' 1850, B. 1, p. 16.

[2] Gudden, 'Virchow's Archiv,' 52 Band.

[3] Kraemer, "Beitrag zur Kenntniss des Leptus autumnalis," 'Virchow's Archiv,' 1872, 55 B., p. 354, und Taf. xix-xx. Kraemer makes two varieties (Leptus minor et major), which, however, do not differ essentially from one another, and are not by any means sexually distinct. Kraemer has also met with the animal on the *Sambucus nigra*, and even on the mole, the field-mouse, and bat, and calls attention to the fact that the human subject may be attacked by the parasites from very different sources, and even from the lower animals.

[4] Rouget, "Bète rouget of the French; *Acarodermatitis autumnalis*, Southworth," cit. 'Viertelj. f. Dermat. und Syph.,' 1784, p. 126.

of the inunction of fat, to which a small quantity of an ethereal oil has been added. The inunction of ethereal oils alone, as recommended by some, is to be avoided, as it is liable, *per se*, to excite eczema.

THE COMMON WOOD OR DOG TICK, IXODES RICINUS.

The common dog tick (Hundszecke) or wood tick (Holzboch). *Ixodes ricinus*, is, according to Martiny,[1] egg-shaped, yellowish blood-red in colour; thorax darker; abdomen with fine hairs, its lateral walls curved upwards. It chiefly frequents pine thickets. The female, only one line in length, fastens on to the human skin and swells out, owing to the blood which it sucks up, into a vesicular body of the size of a pea. It often remains for days attached to the same part. If we forcibly detach the animal, the head often remains behind in the skin, and then the local inflammation is often very persistent. For this reason it is preferable to make the animal let go of its own accord. This is effected most suitably by applying an ethereal oil to the part from time to time.

Just in the same way as our wood tick acts here, so we find other kinds of tick act which are endemic to certain localities, the *Ixodes marginatus* and the *Ixodes americanus*, the *Ixodes humanus*, Koch. The latter constitutes the plague of the human subject,[2] known as carabatos or carapattos. The Persian Argas (Argas, *Argas persicus*, Randzecke) often infests whole villages.

[1] Cit., by Küchenmeister, l. c., p. 422.
[2] Schmarda, 'Zoologie,' Wien, 1872, 2 B.

2. EPIZOA, AND THE DISEASES OF THE SKIN CAUSED BY THEM.

Lice, Pediculi.

Lice, pediculi, form the first family (Pediculida) of the first division, *Parasita Latr.*, of the first order, Rhyncota (Fabricius, Schnabelkerfe), of the *Insecta ametabolica.*[1]

General Characters.—Parasitic insects without wings, not undergoing any metamorphosis, having two simple small eyes and sucking and masticatory buccal apparatus.

1. *Family, Pediculida.*—Antennæ thread-like, with five joints. Tarsus two-jointed, with a large hook-like extremity. Proboscis retractile. It is regarded as a prolonged œsophagus, and comparable in structure with that of the mallophaga.

The buccal apparatus is an object of special interest in reference to the wounds inflicted on the human skin by the pediculi. Both old and modern observers (Schmarda, Wedl) state that the sheath of the proboscis in pediculi possesses a button-like extremity, furnished with a crown of little barbs, by which the incision in the skin is effected. Then the four bristle-shaped jaws are extruded. On the other hand, Erichson,[2] as regards the *Pediculus vestimenti*, and both he and G. Simon,[3] as regards the *P. capitis*, pointed out that beneath the proboscis there is a pair of mandibles of a brownish colour, and on the proboscis itself a pair of four-jointed palpi. Landois[4] has shown the same thing. We must now suppose that the pediculi first of all bite the skin with the mandibles, and then push the proboscis into the wound so made, in order to suck. The palpi probably serve to select the spots suitable for sucking.

Of this animal there are three kinds which infest the human body:

[1] Schmarda, l. c., p. 87, 89.
[2] Wiegmann's 'Archiv für Naturgeschichte,' 5 Jhrg., 2 B., p. 375.
[3] Simon, 'Hautkrankheiten,' p. 297, Taf. vii, fig. 4 und 5.
[4] Landois, 'Zeitschrift für wissentschaftliche Zoologie,' Leipzig, 1864.

a. The head louse—*Pediculus capitis.*

b. The clothes' louse—*Pediculus humani corporis,* s. *P. vestimenti.*

c. The crab louse—*Phthirius inguinalis,* s. *Ped. pubis* (Filzlaus).

Since Swammerdam has determined the sexual differences and mode of origin and increase of pediculi, their natural history has been so far cleared up, that there is no longer any mystery in reference to their occurrence on the human skin.

There is also just as little mystery now in regard to the symptoms which are produced on the skin under the influence of pediculi. We know absolutely that they are simply the symptoms, in all possible forms and degrees of severity, of eczema artificiale excited by the wounds which the pediculi inflict and the irritation caused by their presence.

Such a simple explanation has not by any means always been accepted. The origin of pediculi in the human subject until quite lately, and, indeed, even to some extent recently, has been associated with the juices of the organism, and they have even been considered to be a direct metabolic product of the latter, and the whole affection, the morbus pedicularis, has been regarded as the outcome of a specific dyscrasia of the body, known by the horrible name of "lousiness" or "phthiriasis," which became prevalent in literature and tradition.

Though this erroneous doctrine may now be regarded as exploded, as a whole, yet certain modern authors have attempted to rehabilitate some parts of it. It is, therefore, advisable to adduce the data on which that doctrine was supported, and thereby to convince the learner of its complete untenableness, and to render the natural history relationship, about to be described, of the pediculi to the corresponding skin diseases, comprehensible.

ON THE SO-CALLED PHTHIRIASIS[1] (MORBUS PEDICULARIS).

The belief in a special "morbus pedicularis" ("Läusekrankheit"), in which the pediculi lived in certain swellings on various parts of

[1] In this historical sketch, I have made use of Hebra's communication, "Ueber die sogenannte Phthiriasis," to the 'Wiener Med. Presse,' 1865, No. 31-36, which, indeed, I have reproduced almost entire, for I quite agree

the body, and now and then escaped from them on to the skin, was widely diffused in ancient times.

The name φθειρίασις, from the verb τὸ φθεῖρειν (to corrupt), was originally chosen for the disease, because the animal was considered to arise from corrupted organic juices. Hence the product of the corruption was designated φθείρ, the louse, and φθειρίασις, lousiness.

According to others, the word was derived directly from φθείρ, the louse. Plutarch himself, in his narration of the death of Sulla from lousiness, makes use of the verb φθειριάω in the sense of "I suffer from lice," "I have lice," and the same word is also used by other authors in the same sense.

The interpretation given by Lorry of the etymology of the word, that τὸ φθείρειν relates to the corruption of the skin produced by the influence of the lice seems to us much less plausible. The ancients did not consider that the lice corrupted the skin, but, on the contrary, that the lice came from the diseased skin, from the caro.

We need only to go back to Aristotle, who was the first to speak of pedicular disease under the name of φθειρίασις, and who then fully mentions the essential features of the views as to the genesis of the disease, which, with slight variations, were accepted and repeated by all believers in the pedicular disease, till the time of Mercurialis, and in part also even later.

Aristotle says, for instance,[1] that the lice are formed out of the flesh, and that in consequence, small pustules, without any pus in them, make their appearance (ἰονθοί μικροί, οὐκ ἔχοντες πύον), from which lice escape when they are pricked. He is further of opinion that the lice arise after certain diseases, and in individuals whose bodies are of a specially watery consistence; and, lastly, he says that birds, fish, and four-footed beasts, with the exception of asses, are liable to be affected with this disease.

In giving this nosogony from the pen of the greatest of the Greek naturalists, we have given everything which the science of the next hundred years had to say in reference to this disease. Whatever else was recorded was limited to more or less vividly painted narra-

with what he says. In the deductions in regard to "phthiriasis," I feel at liberty to be all the more brief, as my description of the morbid symptoms excited by the pediculi is detailed. It is in the latter alone that the arguments against the doctrine obtain force, and not in any scholastic interpretation of "passages of Scripture" and histories.

[1] 'De Hist. Animalium, vol. v, cap. 31.

tives and descriptions of various victims of the pedicular disease, mostly celebrated or notorious characters.

Those who believed in the disease went much further back than the time of Aristotle for instances of it, and found that Pharaoh and all his people were attacked by lice because he would not let the Jews go.

In inflicting the third of the "ten plagues of Egypt," God said to Moses (Exodus, chap. 8, v. 16), "Say unto Aaron, Stretch out thy rod and smite the dust of the land (וְהַךְ אֶתעֲפַר הָאָרֶץ), that it may become 'Chinim' (וְהִיתָה לִכנָם) throughout all the land of Mizraim." V. 17.—"And they did so; for Aaron stretched out his hand with his rod and smote the dust of the earth, and it became 'Hakinom' (וַתְּהִי הַכנָם) in man and in beast; all the dust of the land became Chinim (וַתְּהִי כנִים) throughout all the land of Mizraim." V. 18.—"And the magicians did so with their enchantments to bring forth 'Kinim' (אֶת הַכנִים), but they could not; so there were 'Hakinom' (וַתְּהִי הַכנָם) upon man and upon beast."

In the Pentateuch, published by S. Herxheimer, in Leipzig, 1863, we find a commentary on the above passages, from which it appears that the collective כנִים כנָם, which is only met with here and in Psalm 105, v. 31, signifies lice, according to the traditional explanation and according to Josephus, but, according to the Septuagint and Philo, who certainly knew the state of affairs in Egypt, a sort of small, almost invisible, gnats, which fly into the eyes and pass into the nostrils and ears .... The Talmudic כמח also is not only used for lice, but also for a worm in the fruit (para. 9, 2), and other insects. As these stinging gnats came from the inundated rice fields in the autumn months, like clouds of dust, so was derived .... their origin from עפר (Dust, *vide* text).

From the details here given it is evident that those men who had opportunities of becoming most familiar with the natural history of Egypt, like those who compiled the Septuagint, and Philo, understood by כנִים, not lice, but insects in general, small gnats, which formed one of the regular plagues of the land of Egypt, like the one, in fact, related by Diodorus Siculus, to be mentioned later. Pharaoh and his people, therefore, were not infested with lice in the third plague, but with "Kinim." What these may be we do not know. But we do know that the best translators have not considered them "lice;" and so also the exact Mendelssohn has not translated "lice," but has preferred the more indefinite collective, "insects."

In later times we only hear of isolated victims of phthiriasis. According to Aristotle, the poet Alkmanes and the tragic poet Pherecydes died of phthiriasis. Of the latter, Ælian, at a subsequent period, says: "He first of all sweated greatly, and then lice (φθείρες) grew, and as his flesh decomposed into lice, then followed dissolution, and so he gave up the ghost."

Acastus, son of Pelias, and Makios, and the Athenian philosopher Speusippos, son of Eurimedon, a relation of Plato, and, lastly, Plato himself, are cited as having died of pedicular disease.

According to various statements, also, it would appear that the Olynthian Kalisthenes, who was placed in fetters at the command of Alexander the Great, died of pediculi.

Hippocrates says nothing about pedicular disease, and what Celsus[1] says about it has no resemblance to the description given by Aristotle. He says (l. c.), in the chapter De Pediculis Palpebrarum: "Genus quoque vitii est, qui inter pilos palpebrarum nascuntur; *i. e.* φθειρίασιν græci nominant . . . . . exulceratisque vehementer oculis aciem quoque ipsam corrumpit" (scil. pituita).

Pliny speaks with great caution on the subject, for he says:[2] "In fœdis impurisque corporibus pediculi nascuntur." Still, he mentions elsewhere,[3] in narration, that Alkmanes and others, according to the statements of earlier authors, had died from pedicular disease.

Diodorus Siculus,[4] whom we mentioned in discussing our citation from the Bible, a historian under Cæsar and Augustus, who had travelled through a large part of Asia, Africa, and Europe, relates very extraordinary stories in regard to the Akridophagi (from ἄκρις, locusts, Heuschrecke), a neighbouring tribe of the Ethiopians: "These locust eaters are light and active in their build, but scarcely live beyond forty years of age. Their mode of death is wonderful and horrible. As they advance in years, winged animals, not merely of different varieties, but also of different species and shape, all, however, horrible, become developed on their bodies. Starting from the abdomen and the cardiac region, they soon spread over the whole body. The person affected first experiences a sense of itching, as if scabies were present, and is excited by a slight tickling, in which pleasure alternates with pain. So soon, however,

[1] Lib. vi, cap. 15 (ed. London, 1837, p. 211).
[2] 'Hist. Mundi,' lib. xxvii.
[3] 'Hist. Nat.,' lib. xi, cap. 33.
[4] 'Hist.,' lib. iii, ed. Rhodom., p. 162.

as these animals, originally placed beneath the skin, reach the surface, a large quantity of thin ichor escapes, attended by slight pain, and whilst the patient is continually lacerating his skin more and more with his nails, his miserable existence comes to an end at last."

"When the formation of the sores is at its height, however, a large number of worms make their appearance in swarms, one after the other, as if escaping from a vessel bored at many places, so that all attempts at checking them are unavailing."

Agatharcides mentions these parasitic animals, but regards them as allied to the ticks (*Ricinis similes*).

According to Livy (Lib. ix) and Val. Maximus (L. 1, cap. 2), Pleminius, who had been sent by Scipio as legate to Locus, died of pedicular disease in prison at Rome, where he had been taken for destroying the temple of Proserpina.

Plutarch mentions another variety of lousiness, of which the poet Ennius and the dictator Sulla were considered to have died. Most authors show that, in regard to the first, some confusion has arisen here, for Eunus, the instigator of the Sclavonic war in Sicily, can alone be in question. Of the second of the two (Sulla), Plutarch[1] says that "his whole body became one mass of lice (corpus in pediculos totum versum); and though many persons were employed day and night in removing these lice, yet they were unable to destroy as many as were produced, so that his clothes, bath furniture, wash-hand basin, and food were filled with them. And though he bathed frequently every day and washed and rubbed his body, yet this was of no avail. For the transformation of his body into lice was so rapid that all attempts at cleansing were frustrated (celeritate vincebat enim conversio, superabatque copia omnem purgationem)."

Galen, again, keeps closer to the facts where, in several places[2] in his works, he speaks of pedicular disease, and he devotes a chapter —"De Phthiriasi, hoc est morbo Pediculari"—to it in his book, 'De Comp. Med. Soc. Loc. Lib. I.' He says there that "in many, lice develop in great quantities on the head, and, indeed, out of many heated juices, which, however, are not so hot as the acrid and serous juices. It is, therefore, clear that pedicular disease originates in the deeper parts of the skin, where it is, at any rate, possible that pediculi also are produced, and not on the surface."

[1] According to Lorry, l. c., p. 576.

[2] Lib. 'De Theriaca ad Pisonem,' c. 18; Lib. 'de cibis boni et mali succi;' Lib. ii, 'De alimentorum facultatibus. De simpl. med. ii.'

At that time, and also later, during the Middle Ages, they appear to have regarded pedicular disease as a divine judgment inflicted, therefore, on cruel men in general, despots, atheists, and especially persecutors of the Christians. We hear, therefore, that Antiochus Epiphanes; Herod the Great; his grandson, Herod Agrippa; the Roman Emperor, Cajus Galerius Valerius Maximus; Julianus, the uncle of the notorious apostate of the same name; the Emperor Arnulf; Honorius, King of the Vandals; and Scio, King of the Danes, &c., died of pedicular disease. They were all attacked by such immense quantities of lice, that they, and especially the latter, were eaten away by the lice "to the bare bones."

And that no class, nor even the fair sex, failed to contribute its quota of victims to phthiriasis, we gather from the circumstance that the Bishop Lambertus, and Pheretima, whose death history is related by Herodotus, died in a horrible state from phthiriasis.

Oribazius and Paul v. Ægina, the former in the fourth, the latter in the seventh century, mention remedies which will kill lice and cure the phthiriasis, and recommend various resins and balsams, and veratrum, but especially *Delphinium staphysagria*, known from ancient times as pedicularia on this account. Paul v. Ægina and also Ætius were, moreover, of opinion that lice were developed in consequence of eating too many figs.

Amongst the Arabians, Avicenna and Ebenzoor treat particularly of the epizoa infesting the skin; the former adheres to Galen's definition, but takes into consideration what Aristotle says, and seeks to reconcile the two somewhat by the comment that Aristotle could not have meant his expression as to the "transformation of the flesh into lice" to be taken literally, but that the lice originated between the skin and the flesh, and "quod pediculi ex excrementis calidis tertiæ et ultimæ coctionis putrefactis, non acribus non pravis gignuntur, quia ex acri et virulenta materia nullum animal gignitur."

Avenzoar describes an animal under the name of Soab, of which he says: "In their bodies and on the exterior, something which the people call Soab develops and is met with in the skin. If the skin is removed, a small animal, which is barely visible, escapes at various parts."

For long there was great dispute as to whether Ebenzoor meant lice or nits or *Acari scabiei* by this word Soab. As, however, he elsewhere uses the word Soab or Soabe to designate animals which "live amongst the hair, and can be removed by the comb," and,

moreover, says that these animals cling to the clothes in men and the feathers in birds, there can scarcely be any doubt that he means lice when he speaks of Soab, Asoabat, Soabe.

We cannot refrain from mentioning here the teleological view of Averroes,[1] that the end served by the lice was no less than this—that nature should not remain idle (ut non ocietur natura).

Amatus Lusitanus and Petrus Forestus show us sufficiently what were the views which prevailed during the Middle Ages on the subject of phthiriasis. Thus, the former gives an account of a nobleman of the name of Tabora, in Lisbon, who was said to have died in a miserable condition from this disease. "His body so abounded in lice that two of his Ethiopian slaves were employed in emptying basketsful of lice from his body into the sea." The same author also mentions another case, that of a poor man who had an ulcer on his back, from which a quantity of lice escaped every day, which "undoubtedly had developed between the skin and the flesh." A third case, the narrative of which he reproduces, occurred in a Venetian nobleman.

Forestus reports concerning a distinguished painter (Pictor Boecklandius), "who suffered from an inexpressibly troublesome itching on the back. When a cautery was applied, blisters were produced, which, when pricked, gave exit to a great quantity of lice." In another case he found these animals in a strumous sore.

Zeil ('Cent. V. Epist.,' n. 11, p. 75) relates, concerning Scander Bassa, a Turkish pasha in Bosnia, who invaded Friuli in 1499, and imprisoned and murdered many of the natives, and persecuted the Christians, that his whole body was infested with lice, of which "his physicians could not rid him, but which compelled him to give up the ghost."

Ulisses Androvandes records in his book ('De Animalibus Insectis') that two bishops who had become disgraced on account of simony—Lambertus of Constance, and Fulcherus of Nymwegen—and also the Pope Clement VII, who, indeed, was an anti-pope, died of phthiriasis.

Some "phthiriologists" enter into very great detail in regard to the horrible end of Philip II. When speaking of his death, which occurred at the Escurial, in Madrid, in 1597, they say: "After Philip had suffered for a long time from gout, dropsy, &c., he had a severe abscess of the right knee, and after this was opened four

[1] 12, 'Metaph.,' 18.

others formed on the chest, and so many lice escaped from these that whilst four persons held him suspended on linen, two others by turns could hardly sweep away the lice. Finally, he suffered from numerous ulcers on the hands and feet, dysentery, hydrops, tenesmus, and all these were associated with such innumerable quantities of lice crawling about, that, confined to his bed as he was, he could not get rid of them until his death."

Theophrastus Paracelsus, surnamed "Bombastus," was an upholder of the phthiriasis doctrine, for he said that lice came from tainted blood.

The physicians of the seventeenth century—Hafenreffer, Mercurialis, Joh. Gorræus, G. Francus de Frankenau, &c.—adopt the views of the Greeks and Romans of old, and are fully convinced as to the existence of phthiriasis.

The latter (Frankenau), in his detailed work on this disease,[1] narrates a case of "febris, vulgo dicta hungarica," attended with sweating, observed in Heidelberg in 1676. About the eleventh day of the disease, a number of lice were suddenly noticed crawling over the head and rest of the body, though the patient was a particularly cleanly man. On the thirteenth day he died.

Blondel relates a case in a Dutchman of note, who took a sea voyage in a ship with some Jews, and whom he, through them, "eo morbo pediculari intoxicatum esse suspicabatur. Cutis ejus repleta fuit ut undique ex vola manus, naribus, auribus, oculis, menta, barba, pectore, ano, pene, &c., innumerabiles (pediculos) extrahere posset." After a two months' stay at a watering place the patient returned cured "mutatis vestibus."

Valentini, under the title "De phthiriasi insolita," states that D. Gutman Buxbaum, of Frankfort, communicated the following case to him:

"Two months previously, a man, forty years of age, applied to me on account of severe itching. Purgatives, cupping, &c., were of no avail. At last, after the use of a Decoct. Lignorum for eight days, an eruption of itching papules occurred. One was opened, and within it were 'congeries pediculorum, figuræ et magnitudinis diversæ . . . . . ut fere numerari nequiverint.'"

"Apertis et reliquis tuberculis, et continuato diaphoreticorum et catharticorum mercurialium usu, detersis simul ulcusculis ægrum

[1] 'Frankenau, "De Phthiriasi," 'Miscell. Acad. Nat. Cur.,' dec. iii, a. 5 u. 6, 1697 u. 1698, p. 395.

inter aliquot septimanarum decursum pristina sanitate restitui, qui omni ulteriori pruritu plane immunis vivit."

In the seventeenth century, pedicular disease was supposed to have occurred epidemically in association with an outbreak of typhus. There appears, however, to have been some mistake made here in regard to Bernhardi's[1] febris peticularis, which was more probably a petechial typhus.

In one case of intermittent fever, an eruption of pustules containing lice occurred during the paroxysms. The lice, together with the pustules, vanished again during the intermissions.[2]

Fournier (1671) mentions the case of an old man who suffered from a gouty rheumatic affection of the right half of the body, and in whom, in spite of the greatest care as to cleanliness, a great quantity of lice developed. So long as these insects lodged on the diseased members, the pain abated, but after the removal of the lice it again increased.

It is at this period that we meet with the greatest number of narratives and the most fabulous, the heroes of which—Alkmanes, Pherecydes, Antiochus, Herodes, Sulla, Philip, &c.—we have already alluded to at an earlier date.

Even in the eighteenth century, there were quite enough writers who busied themselves with phthiriasis. Lorry distinctly expresses his belief in the existence of this disease in the words: "Datur certe cachexia pedicularis (l. c., p. 578), ut est cachexia verminosa, quæ climate, usu alimentorum, moribus, communicatione vires sumit." He saw several boys thus unhappily circumstanced, but he never knew one succumb.

Plenck makes five kinds of phthiriasis—capitis, pubis, superciliorum, totius corporis, et interna. From the descriptions he gives of these different kinds, we gather that his first four kinds correspond to conditions which we are now familiar with, bearing in mind that the phthiriasis superciliorum et pubis are caused by one and the same species of animal; whilst his fifth variety, which he thus defines: Phthiriasis interna est ea, in quâ pediculi e diversis corporis locis exeunt, et ex oculis, naribus, auribus, ore, cum urina, sputo, fæcibus. Ægroti emaciantur et pereunt—represents that fabulous phthiriasis which, from time immemorial, and even as we have seen

[1] Bernhardi, "Febris peticularis," in Hecker's, 'Kunst, die Krankheiten des Menschen zu heilen,' 5 Aufl., B. ii, p. 571.

[2] Bernhardi, l. c., und Hufeland, 'Journ.,' 1813, p. 122.

down to the eightheenth century, was regarded as a special disease, differing in its symptoms from those commonly produced by lice, and, in fact, was considered a true phthiriasis, and which even in the present century (on the testimony of Joseph Frank[1]) has found defenders in Chivaud, Cazalis, Albers, L. Marchelli, F. Tournadour, H. Ch. Alt, Harder, J. A. Schultes, also Walentin, Lieutaud, &c., and as we have ourselves found, Gaulke, and also, we regret to say, Landois.

Lieutaud (1767) was of opinion that in phthiriasis, lice were found not only externally on the skin in enormous numbers, but also under the skin and beneath the pericranium. He states that in post-mortem examinations we may find pediculi, not only between the membranes of the brain, but also in the brain substance itself.

Rust reports on the occurrence of white lice, which he says escaped on incising a tumour which had been the seat of intolerable itching. Heberden says that lice which resemble ordinary lice, but are of whiter colour, live in tumours. Lafontaine (1792) reports a case of plica polonica in which millions of lice were present.

Some of the authors mentioned are of opinion that lice sometimes crawl out of the skin with the sweat, or may be met with in peculiar tubercles and suppurating ulcers, or, indeed, in internal organs, for instance, in the heart or in the stomach. The origin of the lice has been attributed to eating tainted human flesh, salted locusts, lice themselves, the flesh of vipers (Galen), figs (Ægina and Aetius), to magic, contact with dogs, and, lastly, uncleanliness in general.

On the other hand, other authors, who, though quoting the opinions of their predecessors, do not defend them, such as Josef Frank and Turner, do not confess any conviction that lice may originate from uncleanliness, or, indeed, be favoured by it.

Willan and Bateman do not allude to phthiriasis; but the former in his account of prurigo senilis mentions a peculiar animal, which he figures in Pl. VI. In the case of an old man who suffered from prurigo, there were a great number of these present, and this was the only instance in which Willan had an opportunity of observing them. Neither the disease nor the insects spread to the wife or any members of the family. Bateman, however, did not coincide with the view that the animal in question was a louse, for he says it certainly was not, but belonged to the genus Pulex.

[1] L. c., 3 B., S. 126.

Biett, who was quite aware of the occurrence of *Pediculi vestimentorum*, nevertheless confounded the symptoms produced by them on the skin with the excoriations occurring in prurigo, so that he classed them together as prurigo pedicularis. Alibert also adopted the designation of prurigo pedicularis, but knew how to separate it from prurigo senilis. He is of opinion that the insect may develop in countless numbers, and, so to speak, in the skin itself, and propagate itself. He narrates the history of a certain H. Laval, who for twelve years had suffered from prurigo pedicularis, and had tried the most various remedies for it, and had practised the greatest cleanliness, all, however, without any avail. Lice appeared on all parts of the surface of the skin, the hands and face alone remaining exempt. On the skin of the trunk there appeared an eruption of vesicles as large as peppercorns, in which, in less than twenty-four hours, lice of various sizes and in great numbers became developed, and excited such frightful itching that the patient incessantly tore his skin to pieces with his nails day and night. "The most extraordinary point in the history of this case, however, was," says Alibert, "that so soon as these animals had vanished, symptoms of extreme anæmia developed themselves. The pulse became weaker from day to day, the tongue became dry, the patient emitted a stench, such as arises from decaying animal and vegetable substances, and at length died in great suffering."

Rayer disputed the existence of phthiriasis, and merely quotes many of the narratives previously alluded to without believing in the truthfulness of them. He recognises the three species of pediculi at present known, as well as the morbid appearances excited by the presence of the animals on the skin. He forms a praiseworthy exception to his French colleagues generally, for the greater number of them believe in the existence of phthiriasis, and even partly consider that the lice become spontaneously developed. For instance, we may mention Chausit,[1] Gibert,[2] and Devergie,[3] the latter accusing the physicians of the present time of treating too lightly of the existence of phthiriasis, whereas the older physicians attributed great importance to it.

Devergie states, moreover, that in young individuals, though the greatest cleanliness may be practised, it is not by any means a rare occurrence for a considerable quantity of pediculi to

[1] L. c., p. 426. [2] L. c., p. 263. [3] L. c., p. 647.

become developed on the head suddenly, as it were, during convalescence from severe diseases or following after a sense of discomfort, loss of appetite, general debility, &c. So also he cites neglect of cleanliness, misery, and poverty, and their consequences, as causes leading to the development of pediculi on the head; and though, lastly, he does not deny that pediculi may be conveyed from one person to another, yet he accepts the view that in many cases pediculi may also develop spontaneously in adults as well as in children and in old people, under certain conditions of temperament, constitution, and social status. As authority for this opinion he cites a former physician of the St. Louis Hospital, M. Möronvalle.

Hardy and Bazin[1] do not join in this opinion, for they neither believe in phthiriasis nor in the spontaneous origin of pediculi. Nevertheless, Hardy maintains that we ought to regard prurigo pedicularis as a substantive disease, and he considers it by no means of slight importance, but, on the contrary, in old people, thinks it a severe affection, which, as he believes, in many cases utterly defies all our remedies.

Whilst, therefore, the French are divided in their opinions as to phthiriasis, our English contemporaries are markedly superior to them so far as this, that they relegate all reports as to phthiriasis to the region of the fabulous.[2] Yet at a meeting of the Medico-Chirurgical Society, in London, on January 15th, 1838, Mr. Bryant brought forward the case of a governess who had been admitted into Guy's Hospital, suffering from phthiriasis in a high degree, and whom it was found quite impossible to thoroughly cure of the disease.[3]

Amongst modern German authors, Fuchs is the only one who acknowledges himself an upholder of the doctrine of phthiriasis. He does not, however, consider it due to true pediculi, but to a peculiar kind of mite, Acarus, or Gamasus Latreille, and does not call it by the name hitherto in use (phthiriasis), but by a new one suggested by himself—*Cnesmus Acariasis*.

He says: "There is, as is shown by a considerable number of observations of other authors, and as I have convinced myself by post-mortem examination, a malady commonly called phthiriasis, or lousiness, in which mites (of the species Acarus, or Gamasus

[1] L. c., p. 244.
[2] Wilson, l. c., p. 293.
[3] 'Gazette Médicale,' 12 Mai, 1838.

Latreille) resembling pediculi, develop in the tissue of the uninjured skin, and escape from peculiar tumours which burst. This form, which Sauvages and Plenck distinguish from lice on the skin as *Phthiriaris interna* or *externa*, I consider to be a peculiar form of Cnesmus, and name it, as the animal met with in it is not a pediculus (φθείρ) at all, but an acarus, Acariasis."

Fuchs states that this animal may be at once distinguished from the true lice by the fact that it never travels from one person to another.

The symptoms set up by this animal consist in the development of soft protuberances, of a dull deep-red colour, and of the size of peas or beans, or even, in certain cases, of still larger size. Owing to the violent scratching which ensues, some of these tumours sooner or later become torn open or give way spontaneously, a slight quantity of a clear or ichorous fluid escaping, and also innumerable small animals of a whitish colour, which move about actively and spread in swarms over the body.

By degrees more and more of these tumours burst, fresh ones make their appearance, the whole body becomes covered, the biting, itching, and burning in the skin steadily increase, the patient, already cachectic, becomes extremely feeble, cannot sleep, loses appetite, the perspiration has a disagreeable odour, and, not unfrequently, fever develops and takes on a putrid character.

At another part, the author, after he has quoted the case recorded by Alibert, of H. Laval, who suffered from prurigo pedicularis, states that he had under his own observation a case of so-called "phthiriasis" with cnesmus, which in its course showed a number of "other uroplanic" symptoms. In this case, the subject of which was an old cachectic peasant woman, numerous dull-red tubers developed on the skin of the neck and back, from which, as they burst, "small mites resembling pediculi escaped in thousands. The patient died of marasmus."

This and other cases mentioned in Fuchs' work led him to the conclusion "that acariasis is a product of uroplany . . . . and that it is favoured by the presence of syphilis, gout, &c."

Dr. Alt has attempted to give a more scientific basis for the doctrine of phthiriasis. In a dissertation, 'De Phthiriasi,' in 1824, at Bonn, he started a proposition based on two cases observed by him, in which great numbers of pediculi were present, that these pediculi were of a particular kind, which he called *Pediculi tabescentium*. The pediculi taken from these patients were figured, and

were characterised by their having a more spherical head (capite magis rotundato) than the *Pediculi capitis* and *vestimenti*, longer antennæ (antennis longioribus), and a longer and broader thorax in comparison with the abdomen (thorace ratione habita abdominis longiori et latiore), and, lastly, by the margin of the abdomen on both sides appearing slightly sinuous (abdominis margine utroque ter obiterque sinuato) . . . : &c.

The characteristics of this newly discovered *Pediculus tabescentium* just recapitulated were made the subject of careful study and put to the proof by Dr. Leonard Landois, and his results are published in the 'Zeitschrift für wissenschaftliche Zoologie' (herausgegeben von C. Theodor v. Siebold, und Albert Kölliker, 14 Bd., Leipzig, 1864, pag. 39 *et seq.*). Landois found that the representation given by Alt, of the *Pediculus vestimenti* was incorrect in some respects, and that, on the other hand, we not unfrequently meet with specimens of this form of pediculus which are unmistakably identical with the figure given by Alt of his *Pediculus tabescentium*. This circumstance, and other anatomical and natural historical facts recognised by him in his observations have led Landois to the thoroughly justifiable conclusion that there is really no *Pediculus tabescentium*, and he is supported in this view by Küchenmeister, G. Simon, Hebra, &c.

If the *Pediculus tabescentium* of Alt is not really a separate species of pediculus, then also it is clear, at the same time, that only the three forms of pediculi already mentioned, and which have been well recognised for long, the *Pediculus capitis*, *P. vestimenti*, and *P. pubis*, are alone met with in the human skin; and since the sexual origin of these animals has been proved beyond doubt, and no question of any generatio æquivoca can be entertained for a moment, phthiriasis in the meaning attributed to it by the older authors must be wholly set aside. It is quite impossible to believe any longer that pediculi, and in large numbers, could emanate from the skin, the flesh, the juices of the body, and escape from the eyes or nose, or with the urine, &c., as was considered to be the case by the authors of the narratives quoted above in Hebra's historical account, and taught axiomatically in the expression of Aristotle: Pediculi ex ipsis animalibus fiunt, in quibus generantur. And it is now generally regarded as established beyond question, that the narratives of pediculi having emanated from the body, or having been found in or under the

skin, are in part mere myths, and in part have originated in a confusion with maggots, which may, of course, be met with in wounds.[1]

It is only in one quarter that "phthiriasis" is regarded as a peculiar disease, not entirely in the sense of the old authors, however, but with the restriction that the pediculi do not originate in the body, but accumulate in large quantities in closed swellings and dry cavities in the skin and the subcutaneous tissue, and after the bursting of these "dry" abscesses may crawl forth in great numbers.

Dr. Gaulke, in Insterburg, first of all recorded two cases of this sort, which came under his own observation in 1863, in 'Casper's Vierteljahrscrift.'

The first case was that of an old, paralytic, imbecile woman, who, being afflicted with *Pediculi vestimenti*, suffered from a severe eruption on the skin. Innumerable small cavities, about a quarter of a line in depth, and of the size of peas, could be seen in the skin, and they were swarming with thousands of pediculi. The woman died of "phthiriasis externa," and no other disease whatever could be discovered.

In the second case, that of a man who is described as anæmic and cachectic from a dissolute mode of living, his face having a yellowish tinge and his skin a thin, parchment-like appearance, Gaulke observed nearly a hundred spots of the size of peas or hazel nuts, partly open, partly covered with thin skin of a livid red colour, somewhat elevated, and resembling abscesses. In the open cavities were thousands of pediculi, but not a drop of pus. The closed cavities, covered with parchment-like skin, when examined with a lens, showed numerous pores of the size of pins' heads, and felt like a sack filled with shot. When these burst their living contents escaped, but not a drop of fluid. He remarks, further, that the accumulation of pediculi in the subcutaneous cellular tissue results from the fact that the pediculi perforate the skin with their anal prickers, in order to deposit their eggs.

Gaulke added a fresh communication in 1866.[2]

Gaulke's statements have met with an energetic advocate in Landois,[3] who has twice taken up the subject and sought to esta-

[1] Husemann, 'Zeitschr. der Wr. Ges. d'Aerzte,' 1851; Bärensprung, 'Die Hautkrankheiten,' p. 123 u. A.

[2] 'Wr. Med. Wochenschrift,' Jahrg. 1866, p. 380, 398.

[3] Landois, "Ueber die Existenz der echten Läusesucht," 'Wr. Med. Wochenschr.,' 1866, p. 265 *et sequ.*, p. 620.

blish the possibility of the occurrence of accumulations of pediculi in closed abscesses and in the subcutaneous tissue, which would represent a true phthiriasis. He has not, however, himself personally observed such an occurrence, and bases his views, on the one hand, on the *de merito*, though from his standpoint exceptionable, statements of the older authors, and Gaulke's description, which reveals, however, but a very slight acquaintance with pathology, and, on the other hand, on the supposition, which he has never verified by his own observation, that the *Pediculi vestimenti* bore into the skin itself by means of their suctorial organ.[1]

In his work published in 1865, already mentioned, and in a reply to Landois in 1866,[2] Hebra has shown afresh that pediculi, owing to their anatomical structure, cannot live in closed cavities nor in fluids; that no observer, not even Landois, has ever really seen such an occurrence;[3] and that neither in the sense attributed to it by the older authors (generatio æquivoca), nor in the sense suggested by Gaulke and Landois (pediculi in and beneath the skin), is there, or has there ever been, such a disease as phthiriasis.

The exceedingly large number of patients—more than 10,000—affected with pediculi, coming under the observation and treatment of Professor Hebra during more than thirty years, and of myself for the last ten years, have shown that pediculi do not give rise to any other cutaneous symptoms than those usually produced by epizoa and chronic cutaneous irritation of other sorts, and which we have always comprehended under the terms eczema artificiale, and excoriations, and have repeatedly described in the course of this work.

The injuries caused to the skin, and the eczematous symptoms, have a special clinical character, in accordance with the variations presented by the three kinds of pediculi, as regards anatomical relations, dwelling-place, and mode of life, and the frequency with which they have affected the skin, and the time they have lasted.

To fulfil our object properly, therefore, we must deal with the natural history of the three known kinds of pediculi separately.

[1] L. c., p. 297.

[2] Hebra, "Noch ein Wort über die sogenannte Phthiriasis," 'Wiener Med. Wochenschr.,' 1866, p. 425 *et sequ.*

[3] Landois' "urgent request to all his fellow-practitioners, in the interest of science, to communicate observations on any cases of phthiriasis coming under their notice" (l. c., p. 623) has not as yet met with any response.

The description of the particular morbid symptoms corresponding to them will follow in succession.

(*a*) THE HEAD LOUSE.

Pediculus capitis.

The head louse—*Pediculus capitis*—is of a greyish colour and 2 mm. (·08″) in length. The young escape from the nits at the end of nine days, and are fully developed at the end of eighteen days. It is distinguished from the clothes' louse—to be described later—by having a broader thorax, and by the darker colour of the margins of the abdomen. The head and the extremities are comparatively somewhat thicker. The claws of the latter show on their inner side a finely indented margin. The stigmata, six in number on either side, are arranged symmetrically, and placed near the lateral margin. Over the abdomen, broad connecting arches pass from one tracheal trunk to the other.

The thorax is oblong and more slender than the abdomen. The latter shows seven dark-coloured segments indented at the margin. The six feet are alike. The last tarsal segment carries a large claw on its outer side; on the inner side, are two straight, thick, horny projections and a large bristle.[1]

The males (Fig. 24) are fewer in number than the females; their last abdominal segment is prominent and rounded off. It is furnished on its dorsal surface with a valvular opening, beset with an abundance of asperities, which serves at the same time as an anal opening and porus genitalis. There are two pairs of testes and a simple wedge-shaped penis, which, placed with its base inwards and its apex outwards, opens upon the back.

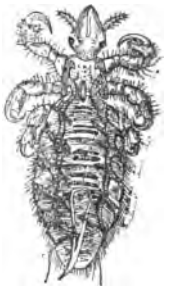


FIG. 24.—Male *Pediculus capitis*, showing its system of tracheæ and its respiratory stigmata (from Küchenmeister).

The females are more numerous and larger than the males, and appear deeply notched at the apex of the last abdominal segment, as if divided into two lobes, between which is the anal aperture surrounded by numerous hairs. There are two

[1] Wedl, l. c., p. 810; Küchenmeister, l. c., p. 439.

ovaries, and each consists of five tubes discharging their contents into two oviducts and a common vagina, into which two seminal receptacles also open. The vaginal aperture is situated on the ventral surface between the last two segments. Its lower surface forms a transverse ridge, which is extended in an arched form across the body, and is beset with small digitate asperities, arranged in from four to six parallel rows, and their vicinity with small, horny, warty eminences. Hence copulation can only take place by the female mounting upon the male.

The eggs of the common head louse are pear-shaped and about a quarter of a line in length. The anterior (free) pole is blunt and furnished with a flat, round operculum, which at the margins passes over into the side walls almost at a right angle, and appears let into the rest of the chorion by a shallow furrow. The posterior (attached) end is pointed. The lice do not simply glue their eggs (nits) to the shafts of the hairs, but form a tolerably complicated structure, such as is truly represented in Fig. 25, carefully drawn from nature.[1] It consists of a chitinous framework, in which two different parts can be distinguished. The one represents a sheath which surrounds the shaft of the hair for some distance. The second part, which is practically one with the former, represents a ploughshare-shaped body, whose apex is directed downwards, and is lost imperceptibly in the substance of the sheath. The base of the ploughshare-shaped process is directed upwards and possesses a deep saddle-shaped excavation. In this saddle or nest is lodged the louse-egg with its lower third embedded in it.

The inner surface of the sheath described closely surrounds the hair passing through it, for it is glued to it.

These facts are not only of great interest scientifically, but are also of practical importance. For it is owing to them that the removal of the nits is such a difficult matter. We shall treat of the latter point more in detail under the head of treatment.

As a rule, one nit only is glued by the louse to a hair, but now and then three or four nits may be attached to the same hair in succession from below upwards, apparently as the animal crawls on the latter in the direction named. If such were the case the lowest nit should be the oldest and the highest the youngest. This may

[1] The figures, therefore, given by Anderson (l. c., p. 191) and by Küchenmeister (Taf. ix, fig. 12) are not sufficiently accurate.

be seen in the representation given in Fig. 25. In the lowest egg, the young animal can be already recognised; in the second, the yolk is furrowed, and in the third is merely indistinctly granular.

The pediculi, however, always attach their nits to the hairs near their point of exit from the follicles, because here, buried amongst the hair, they are for the most part protected from injury, the warmth necessary for their hatching is obtained, and the animals themselves are most numerous. When the hairs have nits at a distance from the scalp, and near the pointed extremities of the hairs, we gather that the individual has for long suffered from pediculi, so that in the mean time the hair has grown to such an extent that the part to which the nit is attached was formerly near the scalp, but is now removed to a corresponding distance.

The pediculi congregate chiefly about the hair roots, because they derive their nutriment from the skin.

The head lice are found only on the scalp, never on other hairy parts. If very abundant, they are tolerably uniformly distributed over the whole scalp. If less numerous, they appear confined in colonies, as it were, to particular favourite positions. These are the occipital and the two temporal regions. They may be lodged in considerable numbers in the localities named, and may have already excited marked morbid symptoms there before spreading to other parts, and especially the frontal portion of the scalp.

The fecundity of the head lice (of lice in general) is extraordinary. A single louse may lay fifty eggs within six days, which may be hatched in from three to eight days. The "young ones" are capable of laying eggs themselves in another eighteen days or three weeks. A pregnant louse,

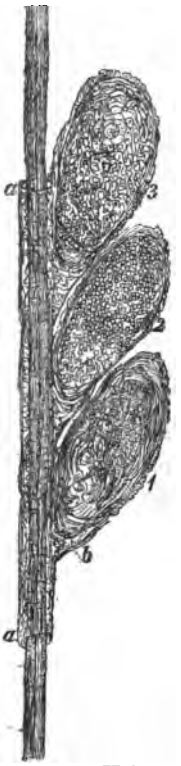


FIG. 25. — Hair of the head, with three nits. *a a*. The sheaths corresponding to the individual nits, with their ploughshare-like processes *b*, (b^1, b^2, b^3), in each of which, as in a saddle, there is an egg (1, 2, 3) lodged. 1 is the oldest and ripest egg, and shows the young louse distinctly developed; 2 is the youngest, and shows the yolk segmented; 3 is the youngest egg.

therefore, may be the means of bringing forth some 5000 young ones in the course of eight weeks.[1]

THE SYMPTOMS DUE TO THE PRESENCE OF PEDICULI CAPITIS.

The symptoms excited by the *Pediculi capitis* are those of local artificial eczema and its local consequences and complications. This eczema does not differ in any essential particular from that due to any other irritating cause. Nevertheless, owing to the special localisation of the irritation, its chronic duration, and its associated complications, it gains a peculiar clinical character, which is recognised by practice, and which, for the sake of shortness and clearness, we will designate pediculosis capillitii.

SYMPTOMATOLOGY OF PEDICULOSIS CAPILLITII.

The symptoms of pediculosis capillitii are developed most completely and abundantly in females, for the pediculi find in the thick hair a convenient nest where they can live and increase. They accumulate here in extraordinarily large numbers, and especially when the individuals affected, from want of reason, false shame, or indolence, instead of exposing the evil, carefully cover up the part infected with lice, by means of a skilfully arranged headdress, and thus protect the parasites quite unnecessarily from injury.

A female so infected will show symptoms of eczema impetiginosum faciei et nuchæ. On the face there will be isolated or grouped vesicles or bullæ, of the size of a pin's head or of a pea, filled with a clear serous or yellow purulent fluid. Others have dried up into yellow, honey- or gum-like crusts, corresponding to the contour of the blebs. Such crusts may also be collected in heaps, and there

[1] A. Kefferstein, 'Naturgeschichte der schädlichen Insekten,' Erfurt, 1837, 1 Th., p. 6.

may be pigmented patches of a bluish-red or brownish tint corresponding in size to the healed blebs. The external ears are covered with eczema impetiginosum, or with red, scaly, or weeping patches, of an irregular shape, with thickening of the skin here and there, and fissures in the furrows. On the neck, from the margin of the hair downwards to the shoulders, and steadily decreasing in severity in the same direction, are red, scratched papules, vesicles and blebs, pustules, recent linear excoriations, and pigmented patches and streaks, and occasionally even large boils. The cervical glands along the posterior border of the sterno-mastoid, and, not unfrequently, also the glands in the submaxillary furrow, are swollen as large as hazel nuts, and quiescent, or one or the other may be inflamed, fluctuating, and suppurating.

The face may be pale and cachectic in some cases, whilst in others it is of healthy appearance.

If we remove the head-dress (kerchief, cap, coiffure, chignon) and lift up the front hair, if it has been smoothly brushed back, we shall expose a confused mass of hair (toupet), a true plica polonica ("Weichselzopf"). On examining closely the superficial layers, we shall soon perceive some lice scurrying away, and, especially on the hairs at the sides, numerous glistening blackish nits.

It is only, however, by lifting up the whole head of hair from the neck that we shall see the true nest of lice at the roots of the hair. Here the lice swarm as if one had disturbed a nest of ants, and the hairs are thickly set with pediculi.

At the same time, we observe the symptoms of eczema capillitii. The hairs are matted together for some distance by crusts, here and there are weeping patches and excoriations, and the finger passed over the surface encounters isolated, heaped-up, firm, dry, bossy crusts. If the hairs are separated, so that we can see the surface of the scalp, we shall find raw surfaces, here and there, of the size of fourpenny pieces or even half-crowns, covered with red, prominent granulations, which bleed easily.

Such are the characters presented by a well-marked case of pediculosis capillitii.

The development of this very complicated group of symptoms proceeds from a very slight beginning, and in many cases may be traced with very little trouble.

A child accidentally catches a pair of lice from some other indi-

vidual. As already mentioned, in describing its natural history, the insect has a buccal apparatus, by which, in the first place, it bites the scalp, then its proboscis is protruded, and it sucks up into itself blood and serum. The louse, therefore, directly wounds the skin, and thus causes the escape of blood and serum, the formation of crusts, suppuration, and the collection of pus under the scabs. In addition, however, by its crawling and sucking, the louse excites the sensation of itching, and this again leads the patient to scratch the affected parts. The use of the finger-nails now gives rise to fresh excoriations, effusion, and formation of scabs. These wounded places smart. If the mother or nurse in charge of the child touches these places with the comb, the child begins to cry and resist. The crusts are then seen, and whoever is attending to the child avoids them, for fear of causing fresh injury and making the child shriek. The diseased spot and the colony infesting it are thus left undisturbed. The lice can multiply without hindrance. The diseased territory naturally, therefore, becomes larger and larger as the lice increase in number, and the region in which the comb can be used becomes smaller and more superficial. And when at length we inform the mother of the nature of the malady, she remains incredulous as long as possible as to its being due to the presence of lice, even when she sees them swarming in countless numbers before her eyes, for she has combed the child's head daily with her own hands, and will not let the reproach of neglect rest on her.

The other symptoms spoken of are merely the further results of the primary ones mentioned. For instance, the formation of granulations on the individual patches of eczema. It is a peculiarity of eczema of the hairy parts, especially, therefore, of the scalp and hairy parts of the face, that granulating sores develop from and around the hair follicles. They have given sycosis its name (from the resemblance to the granular interior of a fig), and when located on the scalp have led to the designations tinea granulata, achor granulatus, achor mucosus, porrigo granulata. As at the same time eczema capillitii resulting from pediculi is mostly in isolated patches, Hebra is justified in his assertion that porrigo granulata in separate patches is always due to *Pediculi capitis*.

We see, therefore, from the above description of the process of development of the symptoms, that mothers and physicians are quite wrong in objecting that the "scab" (grind) was there first

and had caused the pediculi, forgetting the anachronism of supposing that the pediculi have developed out of the crust.

That the matting of the hair, which may amount to the formation of a complete plica polonica, is merely due to the mechanical glueing of the hairs together by the eczematous secretions, and to the neglect of the use of the comb, ought to need no further explanation after what we have said in regard to plica polonica at page 82, &c., vol. iii.

The symptoms of swelling and suppuration of the glands of the front and back of the neck mentioned above are the natural results of the inflammation of the scalp extending over months and years, and are not due to scrofula. A prolonged adenitis may, however, induce cheesy infiltration, and finally exercise an injurious influence on the general nutrition. The individuals may then become pale and appear badly nourished. It must not be forgotten, however, that in many persons the pediculosis capillitii is only one symptom among many indicating faulty external conditions in general and neglect.

The impetiginous eczema of the face and of the ears is merely a result of the eczema capillitii, in the same way that we always meet with it under all circumstances as soon as a primary outbreak of eczema has occurred in the neighbourhood or on some distant part.

Those who have comprehended the description we have given of the process of development of the symptoms of pediculosis capillitii cannot entertain any doubt as to the *cause* of the same, especially since Swammerdam has made known to us the difference of sex of the pediculi, their sexual increase, their eggs, and their development. In any case, a louse, and a pregnant one, or a pair of nits, must be carried to the head before *Pediculi capitis* and the symptoms of pediculosis capitis can occur. How these are then developed step by step has been pointed out already.

Yet, we still hear and read of expressions of wonder at the presence of pediculi at all, and the causes of their occurrence in special cases, or their development in such large numbers, or within so short a period, or in persons occupying a high position in society.

How far in such exceptional instances we are to infer a *generatio equivoca*, or a dyscrasic origin of the pediculi, has been answered in the preceding chapter on "Morbus pedicularis."

I will only remark here, that in the instances in which *Pediculi capitis* have been observed to develop suddenly in great numbers in sick people, *in extremis*, or on the cadaver, the circumstances have been misinterpreted. Any individual, especially if possessing long hair, may be infested with pediculi if confined to bed by illness, unless the head is well combed, and the more readily if the patient is in a situation, in a hospital, for instance, where lice are imported by other individuals. The more severe the disease, the longer will the patient's head be undisturbed, because he is very ill, and the more leisure will the pediculi have to accumulate.

As regards the throngs of lice met with on the cadaver, their source of origin is not to be looked for in the patient, or in the sick chamber, but in the mortuary. When a fresh corpse is brought in, the whole collection of pediculi brought by other corpses, and in a state of starvation, hasten to the fresh cadaver, because they hope to find there fresh food, and not what has already decomposed—*nil mirari!*

Pediculi capitis occur most commonly in children and young people, but sufficiently often in adults, and then more frequently in females rejoicing in a luxuriant growth of hair, than in males; amongst the lower orders, who take less care of their persons, more frequently than among the better classes of society. As, however, the causes of pediculosis capillitii are the same in all, *Pediculi capitis* make their appearance everywhere as soon as those causes are at work. We meet with them and the symptoms associated with them, in the most elegant boudoir, and under the most costly coiffure, in lying-in women after prolonged confinement, or after long confinement to a bed of sickness of any sort.

The *diagnosis* of pediculosis capillitii is not attended by any sort of difficulty. Nevertheless, it must be admitted that, unfortunately, the state of affairs is very often not recognised by practitioners, that is, properly speaking, is overlooked. The eczema of the face and of the ears is treated, but the necessity of lifting up the hair and seeking for the source of the disease is forgotten. For this reason, I think it worth while to call attention to the fact that an outbreak of eczema of the sort described, on the face and neck, and accompanied by enlargement of the glands, should lead us to inspect the roots of the hair for pediculi. If this indication is followed out we shall save ourselves many a subsequent regret, and be able to cure our patient quickly.

It must here be borne in mind that the quantity of pediculi is not by any means in direct ratio with the amount and intensity of the eczematous symptoms. In patients with very irritable skins, in children, and in ladies with delicate white skins, a couple of pediculi and a few nits suffice to excite a tolerably intense eczema, and the more so as the latter, *per se*, induces a further extension of the eczema. We must not, therefore, regard the somewhat transitory presence of pediculi and nits as possibly non-essential and of secondary etiological importance. On the contrary, it is always the chief feature of the case.

Treatment.

The question of the treatment of pediculosis capillitii, includes, in the first place, that of destroying the lice and the nits; and, secondly, the cure of the eczema.

In regard to the first, ointments containing mercury have been in use from ancient times, and are still in vogue as popular remedies, and various aromatic ethereal oils and vegetable decoctions and infusions, or salves prepared from the same, for instance, decoction and ointment e seminibus Sabadillæ, Staphysagria (Pedicularia), Oleum Lauri and the like.

We now possess a much handier and more suitable, and at the same time very cheap, remedy for the destruction of pediculi, in petroleum. In addition to its property of killing the pediculi and ova, it also possesses the further advantage of being an oily substance, and thus softening the eczema crusts at the same time. As, however, petroleum easily catches fire, it is advisable to mix olive oil with it, and we also add some balsam of Peru. The latter is also a parasiticide, and hides in some degree the disagreeable odour of the petroleum.

The hair is thoroughly treated, down to the very roots, every hour, with a mixture of 100 grms. (℥iij) Petrolei venalis, 50 grms. (℥iss) Olei Olivar, and 10 grms. (℥iiss) of balsam of Peru. The head is covered with a flannel cap. After twenty-four to forty-eight hours, not only will the lice and their ova be destroyed, but also the crusts will be softened. The head is now well washed with soap and spirit of soap and water. The dead lice will then be washed away, the ova will appear shrivelled up, and the eczematous

patches will be free from scabs. The matted hairs (in females) must now be carefully smoothed, by first of all separating them into smaller bundles with the fingers, and then these again with a coarse comb, beginning at the distal extremities. We do not cut off the hair in female patients affected with pediculi, as a matter of principle, because we consider it inhuman and unnecessary, and female servants with closely cropped hair find it difficult, for obvious reasons, to obtain a place. We succeed in smoothing out the most complicated plica in twenty-four hours, as we have already described under the head of the treatment of plica polonica at p. 84, vol. iii.

Afterwards the eczema must be treated according to recognised principles.

A rather difficult task, however, still remains to be accomplished, that is, the removal of the framework of the eggs ensheathing the hairs. Although the lice may be all killed and removed, and the ova are shrivelled and in part removed, yet the patient appears as if copiously infested with lice or nits, for the frameworks of the eggs are still there and attract attention by their lustre. They can neither be loosened by oil, nor washing with soap, nor by any substance having a chemical action which will not affect the hairs at the same time. They can only be removed by loosening the connection between the inner wall of the sheath and the hair, and then drawing the former entire along the hair.

The loosening is best effected by means of dilute acetic acid (vinegar), and the removal by means of a small-tooth (dandriff or nit) comb. This is the foundation for the wise popular rule that the small-tooth comb should be used industriously. The hairs are thus drawn individually between two closely placed teeth of the comb, and the sheaths of the nits adhering to the hairs, that is, enclosing them, are dragged away one by one. Washing with vinegar and dipping the comb in vinegar facilitate the process by loosening the sheaths.

The success of the treatment shows, for its part, that the description given above of the connection between the various symptoms is the sole true one. With the removal of the pediculi and the cure of the eczema capillitii, the secondary symptoms of eczema retrograde, and the swellings of the glands subside, whilst for months they may have been regarded as symptomatic of scrofula.

(*b*) CLOTHES' LOUSE, PEDICULUS VESTIMENTI.

The Body Louse (*Zeug oder Leiblaus*), *Pediculus humanus.*

The *Pediculus vestimentorum* is distinguished from the *Pediculus capitis,* just described, by its larger size. In other respects its anatomical characters are essentially the same, and it only differs as regards some unessential variations in form.

According to Küchenmeister's description, its head is exserted, elongated, oval; second joint of the antennæ elongated, the antennæ, therefore, are longer than in the *Pediculus capitis;* thorax distinctly divided into segments; legs longer, more slender, and with larger claws; on the inner side of the last tarsal-joint, two horny stumps and a bristle, as in the common louse. Abdomen with seven segments and with six stigmata on the first six segments. Penis like that in *Pediculus capitis,* but considerably larger, and the asperities about the genital orifice more striking. Orifice of the vagina with rows of spines. Length, three quarters of a line to two lines. Colour dirty white, blacker on the margins (Fig. 26).

FIG. 26.—Female *Pediculus vestimenti* (after Küchenmeister).

The principal distinction between the body louse and the head

louse lies in the size of the former. The body louse is also more active in its movements.

SYMPTOMS EXCITED BY THE BODY LOUSE.

(*Pediculosis corporis; Excoriationes e Pediculis vestimenti.*)

The morbid symptoms excited by the body louse on the skin bear traces of the special impress of the mode of life of this animal in a much more marked manner than those associated with the head louse. They can also only be properly understood when we are acquainted with this mode of life.

The *Pediculi vestimenti* keep quite separate from the head (and crab) lice. They avoid any intercourse with them, and never invade the territory belonging to the others, even when the latter are not present. They are never met with, therefore, on the head.

This kind of pediculi dwell and live only in the body linen and clothes; of course only those in contact with the body. They lay their eggs in them, especially where there are folds, and only crawl out on to the skin to seek food. They copulate and increase just as do the head lice, and as they have a much larger territory at their disposal than the head lice have, their numbers may increase within a very short period to an incredible degree, when no impediment occurs to hinder their propagation and extension.

In such cases this multiplication may reach such an extent that they cannot find any sufficient space in the clothes, and may be met with in large numbers on the bare skin when we remove the clothes. But we see at the same time that they swarm about in great anxiety, and try to leave the naked skin in order to find some hiding place, which they the less easily fail to do, because, as a rule, no man is found without some covering, and the animals, *faute de mieux*, do not disdain to take refuge in the sheets, counterpane, &c.

If we watch a *Pediculus vestimenti* at the moment when it is drawing nourishment from the skin, we shall see that it fastens itself by boring its head into the epidermis at an acute angle, and that its alimentary canal, coursing along the abdomen lengthwise, takes on a continuous peristaltic action, and becomes of a red

colour, which steadily increases in intensity, whilst the skin wounded by the bite of the louse swells up in the form of a wheal.

Now, if the head louse, which is smaller in comparison, causes a sense of itching which leads to scratching, much more so will the clothes' louse, which, in the act of sucking, excites a serous infiltration in the form of a wheal, which, projecting beyond the level of the skin, is more easily attacked by the finger-nail in the act of scratching, and is often considerably excoriated, as the epidermis surrounding the puncture in a circle, being infiltrated with serum, is capable of offering but very little resistance. The excoriations, therefore, which under these circumstances are caused in persons affected with body lice are, as a rule, much larger than those due to scratching from other causes—stings of insects, scabies, &c.

So long as the numbers of *Pediculi vestimenti* are confined within moderate limits, it is only on the neck, where the shirt-collar presses; or around the "waist," where the trousers press closely; or around the wrist corresponding to the shirt cuffs, that we find excoriations of varied extent, numerous bleeding spots, and blackish-brown crusts of dried blood.

When, however, the animals have been at liberty for weeks to act on the skin, the appearances described increase considerably, because the parasites themselves multiply greatly during this time, and the itching and scratching increase correspondingly. As a result, a further symptom becomes developed, namely, a dark pigmentation of the epidermis, such as is present in all diseases of the skin, accompanied by itching and scratching. Not only is repeated hyperæmia of the affected portions of skin produced by the frequently repeated scratching, but also a number of small vessels belonging to the papillæ are wounded and extravasations caused, so that the blood effused beneath the epidermis leaves behind it, after transformation of the colouring matter, merely the dark pigment which makes the dark tint of the epidermis permanent.

If months and years have passed by under such circumstances, and yet the lice still continue at work, this "pigmentation," which at first was but slight, increases to a brown, and at last to a quite black discoloration of the skin, which differs only from that of the negro in that it is not uniform, but shows the deepest tint in those parts coming in contact with folds of the clothes, which, as is well known, are the commonest seats of lice. On other parts, where the skin is scarcely or not so tightly pressed by the linen, as in the

armpits, on the opposed surfaces of the buttocks, on the face, and on the hands, there is no dark pigmentation.

Any one who is acquainted with the manifold morbid symptoms which may be caused in the skin by scratching, will not be astonished if we add, in order to complete our picture of the disease under discussion, that small and larger papules, wheals, pustules, and crusts, from drying up of their contents, and, lastly also, owing to continued scratching, considerable losses of substance in the form of ulcers (ulcers from scratching), may be met with in persons who have for long been affected with *Pediculi vestimenti*.

In extreme cases, we have seen a tolerably considerable number of small and large furunculi, beginning with those of the size of ordinary follicular boils, and reaching to cellular-tissue furunculi of the size of the fist, and, indeed, in one or two cases, we have met with anthracoid inflammations, accompanied by lymphangitis, erysipelas, and febrile symptoms, and ulcers with indolent margins and flabby granulating base, occurring mostly on the back, the neck, over the sacrum, and lower extremities. How dreadful, therefore, a *non plus ultra* picture of an individual, infested with *Pediculi vestimenti* for a long time, may appear to the uninitiated may be gathered from what has been stated.

Many external and internal conditions may contribute to render the picture still more revolting. Poverty and uncleanliness, want and wretchedness of all sorts, hunger and privation, when present, add their distressing quota to the picture. In the well-to-do classes, chronic diseases, paralysis, or prejudice and superstition, leading to a horror of cleansing the body, may contribute greatly to the production of the sad picture; and, in time of war, many circumstances may combine to favour the aggregation and increase of pediculi, such as the congregating together of masses, the constant change of habitation, the want of means and opportunities for cleanliness.

DIAGNOSIS OF PEDICULOSIS CORPORIS.

The diagnosis of pediculosis corporis is not by any means so easy as that of pediculosis capillitii. To those who are but slightly acquainted with the symptoms of the disease, a difficulty as to diagnosis is met with, in the first place, in the circumstance that one may be unable to find a single pediculus or a single nit on the diseased skin. It has been already mentioned that the *Pediculi vestimenti*

live only in the clothes in immediate contact with the skin; it may be in the stays, pantaloons, &c., and there deposit their eggs, especially in the seams and borders, like beads on a necklace. If, therefore, a patient copiously affected with *Pediculi vestimenti*, shows his diseased skin for our advice, he will have put aside his clothes and linen and the lice with them. We may, of course, in such a case, if we suspect pediculi, examine the clothes and find pediculi. But the patient, not unfrequently, just before he comes to the hospital, or before he presents himself to the doctor, has put on fresh underclothing, and then not a single louse can be found.

It is, therefore, necessary that we should learn to recognise the symptoms of pediculosis corporis quite independently. If we find the large excoriations described, larger than lentils and passing in opposite directions in the form of broad streaks, with pigment spots and streaks, corresponding, and diffused dark pigmentation, most pronounced on the localities mentioned, on the neck, on the waist, and the sacral region of the lower extremities, whilst the rest of the skin shows but few or scarcely any excoriations, then we have to deal with a case of pediculosis corporis, in spite of the fact that lice may be absent from inner clothing freshly put on, or that the individual *in toto*, may be cleanly or even elegantly dressed.

We must, also, especially call attention to the fact that persons who are otherwise quite cleanly in their dress, often wear woollen garments ("Gesundheitsleibchen," "Cholerabinde") for a long period without changing them, and lice may be lodged undisturbed in these, whilst the shirt may be changed daily. We have often met with persons belonging to the higher class of society who daily put on fresh linen, and yet suffered from unmistakable symptoms of pediculosis corporis; and we have made a diagnosis of the latter after they had been treated for months for suspected scabies, or pruritius cutaneus, eczema, or prurigo. We were able in each instance to satisfy ourselves of the daily change of linen, of the use of baths, the elegant dwelling, &c., and to show living lice in a woollen garment, flannel waistband, or the seam of a suspender, in the most conclusive manner.

The recognition of the characters above described of the morbid symptoms excited by the *Pediculi corporis*, will always suffice to diagnose the excoriationes e pediculis corporis from the symptoms of pruritus senilis, of urticaria chronica, or of furunculosis, and will

prevent our mistaking the dark pigmentation of pediculosis for a Morbus Addisonii, a melasma cutis, or a pityriasis nigra autorum.

Etiology.

Pediculosis corporis is caused, solely, by the presence of *Pediculi corporis* and, incidentally, by a temporary sojourn or permanent residence in places where *Pediculi corporis* are to be found.

Lice are most commonly found in straw (straw beds, bundles of straw) and other stuffs, blankets, mattrasses, sheets, &c., which have for long been in constant use for bedding, &c. For this reason, the sleeping places for coachmen and grooms in stables, police cells, whose occupants are repeatedly and constantly changed, and bring fresh material, places frequented by scamps and vagabonds, common lodging-houses, sheds for railway workpeople, also the steerage in a passenger ship, the compartments of railway carriages, and the like, are the principal localities in which lice are found. A very short stay in such places, even one night's lodging there, will suffice to infest any one with numbers of pediculi, which will often attack such a one to an incredibly dreadful extent, as a fresh prey, in a single night.

We have shown in a previous chapter on Phthiriasis, that there is never anything in the state of the organism in general which will account for the occurrence of pediculi. Just as little can we ascribe any special predisposition to *Pediculi corporis* to any particular age, sex, or constitution; any individual whatever, whether young or old, healthy or sick, noble or obscure, may and will suffer from *Pediculi corporis*, whenever staying in a place where *Pediculi corporis* occur, and will harbour them in spite of baths, douches or internal medication, until he lays aside the garment infested with pediculi.

The fact that experience shows that old, physically and morally depressed subjects, who are also affected with other infirmities, beggars, drunkards, vagabonds, idlers *ex professo*, form the major part of those affected with pediculi, merely proves that such persons mostly pass their nights in stables, barns, sheds, common lodging-houses, and, by way of change, in police cells,[1] and, therefore, in

[1] Many years ago a whole company of men, women, and children, housed in the bridged-over Alserbach, in Vienna, were affected. Among them was the female represented in Hebra's 'Atlas,' Lief. 5, Taf. 11, who suffered from

places where lice are habitually present; and that they are not in a position to change their under clothing as often as necessary. A great and distinguished railway contractor, or an engineer, who sleeps "on the line," in the workmen's sheds, is infested with lice, just like the journeyman who, during his travels, sleeps for a night in a stable. Such persons will, however, get rid of the pediculi more quickly, because they will soon change their under clothing as well as their outer garments.

It is entirely owing to these external conditions, and not to anything in the constitution, that, in the former individuals, we meet with severe symptoms of pediculosis corporis, boils, ulcers, and deep pigmentation of the skin, whilst in the latter we only see transitory symptoms.

That we meet with morbus Brightii, hydrops, and marasmus, very frequently in those habitually affected with pediculosis, is not owing to the effect of the pediculosis itself, but to the circumstance that such individuals are mostly professed drunkards, and have grown old in a state of great wretchedness.

Treatment.

The treatment of pediculosis corporis is comprised in that of the excoriations, the eczematous symptoms, the boils and ulcers which are produced by the *Pediculi corporis*. This must be carried out on ordinary surgical principles. The phenomena will disappear under a mere symptomatic treatment (moist coverings, simple salves, and plasters) as soon as the source of irritation by the pediculi and the outer and under clothing are got rid of. Even the dark pigmentation of the skin disappears either entirely or in great part.

As the outer and under clothing belonging to the poor, who form the patients at a hospital, must be returned to them when they leave the hospital, there ought to be some arrangement in these institutions by means of which the lice and the ova in the clothes may be killed, whilst the clothes themselves are uninjured.[1]

a universal melanosis cutis, owing to pediculosis. After staying in the hospital for several weeks, the greater part of the pigment had again disappeared.

[1] In the General Hospital at Vienna, a copper boiler with a double case is used. The clothes infested with pediculi are placed in the copper, the lid of which closes hermetically. Then steam, at a temperature of 65-70 R. (178·25—189·5), is let in between the two casings. The clothes, therefore, are in the

(c) THE CRAB LOUSE, PHTHIRIUS INGUINALIS

Pediculus pubis, Linnæus. Morpion.

The crab louse (Fig. 27) has a fiddle-shaped head,[1] with a prominent rounded forehead and a broader proboscidal aperture than the other pediculi, and a somewhat projecting vertex with waved

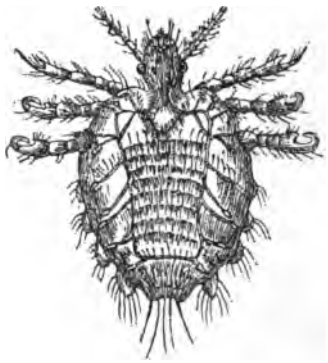


FIG. 27.—The crab louse (after Schmarda).

(buchtig) sides in the neighbourhood of the antennæ; a rather short, broad, rounded occiput; very small, rather prominent eyes, immediately behind the filiform antennæ, which are slightly hairy, five-jointed, and gradually diminish in size, with the fourth joint rather smaller than the third and fifth; with a very broad and flat thorax, emarginate at the insertion of the head, with three pairs of feet, and a stigma between each of the first and second pairs of feet; and with a flat, cordate abdomen amalgamated with the

dry, and are exposed to the temperature named for 4—6 hours. This is sufficient to kill the pediculi and their ova. The patients, therefore, receive their clothes again uninjured and free from pediculi. Certain special arrangements (safety-valve, thermometer, tap to allow of outflow of the water condensed from the steam, as to the inlet of water, and heating apparatus) are made in accordance with ordinary technical laws.

[1] Küchenmeister, l. c., p. 445 ('Syd. Trans.,' vol. ii, p. 82).

thorax. Stigmata six on each side. The last segment of the abdomen in females is notched, as in the other pediculi; in the male it is rounded. It is covered with a certain number of bristles and stumps, and in the female exhibits a vagina and anus.

Only the two anterior feet placed nearest to the head are for walking; the hinder ones are thick, powerful, clasping or climbing (scansorial) feet, furnished with a hook-shaped chitinous process and a curved claw.

The crab louse lives on the hairy regions of the body, with the exception of the scalp; most frequently it is met with in the pubic region, but it may occur equally on the hairs of the breast, of the extremities, of the axillæ, of the moustache and whiskers, and even of the eyelashes (phthiriasis palpebrarum, Celsus[1]), but is never met with on the hairs of the head, and never mixes with either the head or the body louse. It bites deeply and firmly into the skin, generally intruding its head into the orifice of a hair follicle and grasping two neighbouring hairs with its front feet. Its grey colour, and its habit of remaining quiet on the body of the affected person, makes it usually more difficult to discover than the very lively clothes' and head lice. It is also more troublesome to remove from the skin, because it holds fast with its feet and head in the manner described.

It glues its nits near the seat of implantation of the hair into the skin, so that the hair must be cut off quite close to the skin in order to remove with it an attached ovum of a crab louse. The nits in other respects resemble those of the head louse (see Fig. 25).

The itching caused by this sort of louse is less severe than that caused by the head or body louse, but lasts longer; so that it leads to more frequent, if not such severe scratching. For this reason, the objective effects of scratching, which become developed, rather resemble those of scabies. We find papules of the size of millet-seeds, red and scratched at their apices, situated in the neighbourhood of these animals, and therefore most abundantly in the pubic and hypogastric regions, and on the inner surfaces of the thighs. It is only when these parasites are very numerous, and have been present for a long time on the skin, that we see an eczematous eruption present, mostly in the form of eczema papulosum, which excites itching, *per*

[1] Lib. vi, cap. 15.

se, leads to further scratching, and, indeed, may develop into eczema rubrum, *i.e.* form weeping crusted patches.

The ordinary way in which the crab louse is caught is by coitus. But it may undoubtedly happen that *Pediculi pubis* may be transferred without any such intercourse, for they balance themselves very insecurely on the hairs of the body during their wanderings, and fall down here and there.

Treatment.

Inunction of grey mercurial ointment has been used from time immemorial by practitioners and the laity for the destruction of crab lice and their ova. The salve is objectionable in certain cases, owing to its dirty colour. It must be borne in mind, also, more especially, that in some people the inunction of Unguentum Cinereum into the pubic region will give rise to an exceedingly severe and acute eczema, which may increase very quickly into a universal acute weeping eczema, attended by diffused congestion and swelling of the skin, the formation of vesicles, and the production of symptoms of fever. Such an occurrence will happen the more frequently the less patients and physicians pay attention to the first symptoms of the eczema, and the accompanying sensation of itching, attributed to the continued influence of the pediculi pubis, and regarded as an indication for a further inunction of Unguentum Hydrargyri.

That an eczema so excited may confine the patient to his bed for many weeks and months, and keep him from his business, is well known.

We must, therefore, exercise due caution in the treatment of crab lice.

The most suitable application is a mixture of petroleum, Oleum Olivæ, and balsam of Peru, which is rubbed into all the parts infested with the crab lice twice daily with a brush. The remedy must be rubbed in as widely as the growth of hair extends, from the pubes over the abdomen towards the breast and the genitals, anus, and lower extremities. The axillæ must not be overlooked.

After three or four inunctions, in a day or two, therefore, the pediculi will be killed and the ova will begin to shrivel up.

Even the use of the remedies named will redden the skin somewhat. For this reason, therefore, it is advisable to powder the

parts, especially where the sweat collects (scrotum, bends of the joints), and not to allow a bath for three or four days. After a bath, the skin is still more sensitive; itching is often caused by the action of the sweat. The patients are liable to fear that this itching is due to pediculi which have been left behind. We must disabuse them of this idea, and refrain from any further inunction. By dusting on some simple powder, or by washing with alcohol, alcohol and glycerine and the like, the itching will diminish in the course of a few days, and the malady will be cured.

Instead of the oily mixture mentioned, we may use white precipitate ointment [Precipitat. Alb. 2·00 (ʒss), Ung. Emoll. 25·00 (ʒj)], or a solution of corrosive sublimate (1 : 100), and the like.

THE COMMON FLEA, PULEX IRRITANS.

The common flea, *Pulex irritans*, belongs to the class of dipterous insects undergoing complete metamorphosis. It is endemic in almost all parts of the world, but is as yet unknown in New Holland (Australia).

The head of this reddish-brown animal is short,[1] shield-shaped, formed of one piece, not toothed on the margins; the antennæ are short and concealed in a pit behind the eyes. The oral organs consist of a bristle-like tongue, which is covered by two maxillæ in the form of two sword blades. These maxillæ are covered by two narrow mandibles, which lie together to form a sheath, and are toothed on their convex upper surface, like files. On either side of the proboscis, and somewhat covering the base of the four-jointed antennæ, are two massive brown scales, forming a sort of upper lip. The lower lip covers the proboscis from beneath, and like the upper lip appears to be cleft. It is hollow above, acute in front and hairy.

The thorax, which is probably provided with two pairs of stigmata, consists of three separate segments, each of which bears a pair of long legs adapted for leaping. These consist of a strong coxa, with a small trochanter, a strong thigh and tibia, which are but slightly hairy, and of five tarsal joints.

[1] Küchenmeister, l. c., p. 452 (New Syd. Trans., vol. ii, p. 89).

The abdomen has ten rings, laid over each other like the tiles of a roof.

The male is the smaller, and has a broader abdominal end, which appears as if it were cut off straight. The female is larger, and has the last ring of its abdomen obtusely conical, and either pointed or rounded off. The copulation takes place belly to belly. The oval white eggs are a third of a line in length, and are deposited indifferently in dust, and on furniture, and, in dirty people, under the nails; after a few days, the apodal, active larvæ, possessed of a head with two short antennæ, but without any eyes, make their escape. The pupa is developed in a small shell. Küchenmeister asserts, from his own personal observation, that both the male and female bite and suck the skin. The fleas of some of the domestic animals (dog) occasionally infest man.

The Morbid Symptoms excited by Fleas.

A flea-bite, by far the commonest injury inflicted on the human skin, excites precisely the sensation of a bite. It causes a small hæmorrhage in the superficial layers of the cutis, scarcely as large as a poppy-seed, which, just where the flea is fixed and sucks, is surrounded by a brilliant red hyperæmic areola, from two to four lines in diameter, and which is marked off from the surrounding healthy skin by a capillary (fine), quite pale margin. In a quite recent bite it is scarcely possible to determine the boundary between hyperæmia and extravasation, as they are both of an equally bright tint. The hyperæmic portion, however, very soon becomes paler, and the extravasation darker, and the halo finally disappears completely. There then remains a central, hæmorrhagic, dark blue, punctiform spot corresponding to the bite, and which does not disappear beneath the pressure of the finger. Like any other hæmorrhagic spot, it passes through the changes of tint named, within two or three days, and finally disappears completely.

In persons who frequent places infested with many fleas, and especially just after a night's sojourn, we find the skin of the whole body, with the exception of the face, where we only see a few isolated ones, sown, as it were, with flea-bites. If the appearances of the flea-bites show very varied stages as to age, we may then conclude that the individual constantly lives under conditions characterised by uncleanliness. The phenomena are well known to the laity.

If an individual, hitherto quite cleanly, passes a single night in a nest of fleas, the whole body, as a rule, will be covered with flea-bites. When present in such quantities, and so widely diffused and so uniformly, the flea-bites strike many persons as a remarkable form of disease, and may even be regarded as a dangerous purpura. The name purpura pulicosa has even been proposed for such cases, but quite unnecessarily. Mistakes in diagnosis have also actually occurred between such extreme cases and purpura simplex, or commencing scurvy, and the more readily because in such quantities they are mostly only met with in people who have passed the night in a barracks, a lodging-house, a jail, &c., abodes which, as is well known, favour the outbreak of scurvy.

The most important mark of distinction between generally diffused flea-bites and purpura simplex, peliosis rheumatica, and scurvy, in addition to the uniformity of the hæmorrhagic puncta, in contrast to the diversity of the hæmorrhages in the forms of purpura, is afforded more especially by the uniform distribution of the small hæmorrhages, and their being strictly confined to the localities where the folds of the under clothing, the chief places for the deposit of the ova of the flea, are in close contact with the body; consequently, the neck, the wrist-joint, the waist, and the leg just above the ankle. Lastly, also, we have an aid to diagnosis which is by no means to be despised in the demonstration of the presence of the flea and its punctiform, dark brown fæces with which it stains the linen, bed furniture, and even the skin itself.

In children, and in persons with delicate sensitive skins, in addition to the symptoms described belonging to the flea-bite, urticaria also becomes developed, both locally, wherever the flea comes in contact with the skin, and also on other parts of the skin, from reflex irritation. In such cases there is obviously, also, itching present, whilst the flea-bites do not itch.

THE BED BUG, CIMEX LECTULARIUS.

Acanthia lectularia.

The bed bug belongs to the order Rhyngota = Hemiptera of the Hemimetabola.

Its body is of a rusty-brown colour, somewhat hairy; the head

distinctly separated; antennæ long, slender, four-jointed, and behind each, on either side, is a compound eye. Thorax of one joint, with a tubercular pronotum (backshield, Rückenschild); the extremities, six in number, are slender; on the back, two small tubercles, the rudimentary wings; number of abdominal rings, nine, which are prolonged into a point behind. The eggs are elongated, cylindrical, half a line in length, and one eighth of a line in breadth. They are not met with in New Holland (Australia), South America, and Polynesia. They are extirpated with difficulty, because they can bear hunger, and a very low temperature for a very long time, according to Dufur, for a year. Their juice, recognised by its disagreeable stench, is secreted by an azygos gland.

The bugs hide themselves in crevices of the woodwork, frames of mirrors and pictures, bedsteads and furniture, papers on the walls, and they also harbour in the clothes. They readily leave their hiding places at night and attack human beings when asleep, and often in large numbers. They prefer darkness; if a light is suddenly shown, they hasten to their hiding places, the folds of the linen, the bolster. They suck up a considerable quantity of blood, so that the abdomen becomes greatly distended.

Morbid Symptoms caused by Bugs.

The bite of a bug excites locally a large wheal and severe itching. In most people, however, an urticarious eruption is produced wherever the bugs travel, and before long over the whole body. A single bug may excite a universal urticaria.

As a rule, the urticaria disappears or diminishes during the day. It reappears, however, coincidently with the night attacks of the bugs.

The itching under these circumstances is very intense, and excoriations necessarily follow. As the wheals are very large, the two or three middle fingers of the hand, in the act of scratching, usually encounter epidermis loosened by effusion of serum, and excoriations are produced, characterised by two or three parallel stripes.

In persons who sleep for several weeks in a place infested with bugs, the whole skin is, therefore, at last, marked with such recent and old excoriation stripes (not unlike the marks on a ducat—Ducaten-zeichen) or pigment-lines. The appearances are tolerably characteristic of "bed bugs."

The diagnosis of excoriationes et urticaria e cimicibus is not

easily made. We do not see any bug on the body. The circumstance that the urticaria is always most definite in the morning, and diminishes during the day, is in favour of some cause being at work at night—bugs. Persons so affected must, therefore, be directed to hunt for the insects in the bedsteads, the clefts in picture-frames, the wall paper, &c., and root them out.

The diagnosis is made especially difficult by the fact that chronic urticaria and its corresponding excoriations come under our notice habitually as independent affections, and also as symptoms of prurigo (in children), of pemphigus, and many other conditions, to which we have called attention in the appropriate parts of this work.

We still have to mention the Gnats (Tipulida). They have a short, thick proboscis, with two distinct terminal lips and two setiform maxillæ in its interior, and whose five-jointed palpi hang down. Our common gnats, *Culex pipiens*, which swarm in great numbers on midsummer evenings in damp lowlands, in meadows, on the banks of ponds and rivers; the Simulida, mosquitos (Griebelmücken), and a great number of subdivisions of the same family. They only accidentally suck the human skin, and are, therefore, only accidental parasites. Their bite causes a stinging sensation, and, according to the sensitiveness of the skin, or the size and number of the attacking gnats, small papules, urticarious wheals, or large hard boils, phymata, with ecchymoses, œdema, moderate or severe pain, and, if the number be very great, even feverish symptoms. Southern countries, in addition to the small mosquitos, also harbour very large gnats, which are exceedingly troublesome to human beings (such occur even in the neighbourhood of the lower Theiss and of the Drau and Save).

Certain kinds of the Bot-flies, Œstrideæ, occasionally sting man, deposit their eggs in the skin, and give rise to a painful abscess (bot-fly boil, Dasselbeule), from which the larvæ, fully developed, subsequently escape, or can be extracted. A. v. Humboldt, on the strength of such an occurrence, observed in South America, instituted a special kind—*Œstrus humanus*.

Those insects which only sting or wound man accidentally and without drawing nourishment from his skin, such as the bees, wasps, &c., have less right to be classed as parasites than those we have been considering. And it is merely for practical purposes that

we take an opportunity of mentioning here the processionary caterpillar,[1] *Bombyx processionea*, whose hairs, loosened and floating in the air, irritate the skin, and produce an excessively itching eczema papulosum or urticaria. They excite at the same time severe conjunctivitis, œdema of the lids, and irritation in the throat.

The processionary caterpillar, processionary spinner, *Bombyx processionea*, forms on oaks and other trees, a bag-shaped cocoon, often as large as a man's head. The exceedingly long hairs are black and white and stiff. The hairs of the *Bombyx pini*, which are filiform and lancet-shaped, smooth at the sides, and straight, are equally dangerous.

These caterpillars shake off their hairs in the form of a fine powder, and they become attached to any damp objects over which the insects pass; for instance, the perspiring skin. When the nests[2] are destroyed, the hairs fly about and irritate the skin. The lower animals (cattle), also, passing through such forests, are plagued by the hairs of the processionary spinner.

The eruption disappears in the course of a few days under the mildest remedies, or such as are addressed simply to the symptoms present.

Many skins are affected in the same way, that is, are irritated, so that urticaria and eczema are produced, by contact with caterpillars and insects, which would be quite harmless in the case of most persons.

[1] Küchenmeister, l. c., p. 469 (Syd. Soc. Trans., vol. ii, p. 105).

[2] We have on two occasions seen the eruption in students, who, while seeking butterfly pupæ, stumbled on such nests.

APPENDIX.

THE following is referred to at pp. 223-4, and is given here (from p. 485 of the second German edition), as it has been written since the account of the disease previously translated at p. 112, vol. ii:

ECZEMA MARGINATUM (PARISITARIUM).

By Prof. HEBRA (and Prof. KAPOSI), Vienna.

Under this name, I have described a special form of eczema, which is characterised by its discoid or circular form, and its peripheral extension, at the same time that it undergoes involution in the centre, by the well-defined limitation of the patches at the periphery in the form of a continuous or interrupted border, on which the characters of eczema are well shown, and by its being frequently situated on the inner surfaces of the thighs and on the buttocks. As in the first cases I saw, this affection occurred almost exclusively in shoemakers, I was induced to regard this fact as not unworthy of note amongst the characteristics of the disease. Further observation, however, showed that it is not by any means confined to shoemakers, and also that it is met with in females, though comparatively rarely.

It had, also, escaped my observation, in spite of repeated examination, that mycelium is always present in the epidermic layers, and that, therefore, the disease has a parasitic origin. Though this fact is now, owing to the observations of Köbner,[1] Pick,[2] and Kaposi,[3] well established, and even we ourselves can discover the threads of mycelium in every cases of eczema marginatum, yet, I cannot help thinking it advisable to treat of the disease in this place, that is, in connection with eczema, and to adhere to the name

[1] 'Klinische und experimentelle Mittheilungen aus der Dermatologie und Syphilis,' Erlangen, bei F. Enke, 1864, p. 6.

[2] 'Archiv für Dermatologie und Syphilis,' 1 Jahrg., 1 Heft, Prag., 1869, p 61, und 1 Jahrg., 3 Heft, p. 443.

[3] Ibid., 1 Jahrg., 2 Heft, p. 163.

formerly chosen for it, and for reasons which I have stated elsewhere,[1] and which I shall allude to in detail subsequently.

History.

V. Bärensprung[2] has given a description of the disease, quite independently of my own observations, under the name erythrasma, in the following words :—" By this name I designate a contagious eruption, which is limited, for the most part, to the inguinal or axillary regions, having the appearance of a pityriasis rubra, and occurring in the form of roundish or rosette-like, sharply-defined patches, in which Dr. Burghardt ('Preuss. Vereins-Zeitung,' 1859) has discovered a fungus differing from those already recognised. This parasite, which is characterised by the peculiar delicacy of its elements, may be suitably designated *Microsporon minutissimum.*"

The first cases of the cutaneous affection called by me eczema marginatum, which came under my observation, certainly did not correspond to this description, for there were not simply patches of a red colour, covered with scales, in the inguinal region, having the appearance of a pityriasis rubra, but (see my 'Atlas der Hautkrankheiten,' iv Lief., Taf. vi, vii, viii) patches of considerable size, in the form of red circles, made up of vesicles and papules, and having a pigmented centre, and, according to the view I then held, not containing any parasite. At that time, therefore (from 1850 to 1860), I was of opinion that my eczema marginatum was a different disease to that described by v. Bärensprung, under the name erythrasma. I have no doubt now, however, that such is not the fact, for since then I have seen cases of eczema marginatum which, in an early stage, completely resembled erythrasma, whilst subsequently they showed, most markedly, all the characters of eczema marginatum. The discovery of the constant occurrence of a vegetable parasite in eczema marginatum has also afforded further evidence in favour of the identity of the two diseases.

Köbner has described this cutaneous affection under the title mycosis or dermatomycosis tonsurans, and considers that it is identical with the herpes circinnatus of Willan and the herpes tonsurans of Cazenave, because there is, " with the exception of herpes circinnatus, no vesicular affection of the skin going through the same

[1] 'Archiv für Dermatologie und Syphilis,' 1 Jahrg., 2 Heft, p. 163.

[2] 'Annalen des Charité-Krankenhauses, &c.,' Berlin, 1862, x Bd., 1 Heft, S. 140.

course, because, in the cases which he has examined, the fungus found precisely resembled the *Trichophyton tonsurans*, and because he saw circles of vesicles develop on his left forearm within fourteen days after inoculation with 'scales containing fungus,' from a patch of eczema marginatum on the right thigh of a patient."

Pick discovered the presence of fungus in a number of patients in my own clinique, and, subsequently, in patients of his own (in Prague) and, for this reason, and, also, from the results of inoculation experiments which he has tried on himself, and, from the fact that eczema marginatum and herpes (tinea) tonsurans are due to the same parasite, he has come to the conclusion that they are identical diseases. He also offers the suggestion that eczema marginatum should be regarded as a variety of herpes (tinea) tonsurans, which can only develop in epidermis which has been previously macerated, or has been the seat of an attack of intertrigo, and that it should be added, as a fourth species, to the three kinds of herpes (tinea) tonsurans (viz. vesiculosus, squamosus et capillitii) described by me.[1]

However tempting this suggestion of Prof. Pick may appear, and however well it may be justified from an etiological point of view, yet I never like to base the diagnosis of any skin disease solely on etiology, but much prefer to rely on the clinical appearances and the character shown during its progress, for purposes of classification and nomenclature. The reasons which induce me to rank this cutaneous affection, though due to the growth of a fungus, under the genus of the pruriginous dermatoses, and especially under the family of the eczematous eruptions, and which I have already published[2] in part, are the following:

1. Eczema marginatum—whether it occurs on hairy parts, or where there are no hairs—invariably has an extremely slow, chronic course, for the patches only spread peripherally, very gradually, that is, during a period extending over some months and, then, having obtained a moderate size, they appear to remain stationary.

This peculiarity appears to be due to the fact that a maceration of the epidermis must precede the development of the fungus at the margin of the patches, in eczema marginatum. This is the

[1] 'Zeitschrift der k. k. Gesellschaft der Ærzte,' 1854, 10 Jahrg., ii Band, Seite 473, und 'Atlas der Hautkrankheiten,' 2 Lief, 1858.

[2] 'Archiv für Dermatologie und Syphilis,' von Auspitz und Pick, 1 Jahrg. 2 Heft., Prag., 1869, p. 165.

only way in which we can explain the fact that when eczema marginatum occurs on the inner surface of the thigh, it frequently only spreads over the area where the skin of the thigh is continually in contact with the scrotum, and so kept in a state of maceration, whilst it is exceptional for the patches to obtain any large size, and then only after existing for years. Further, if, as a result of long-continued moist applications, or by wearing foul binders (during a cold-water cure, for instance), the epidermis becomes softened over a considerable area, an outbreak of eczema marginatum may often be localised to the part covered by the binder, and scarcely spreads at all beyond the limits defined by the binder.

What occurs in herpes (tinea) tonsurans is quite different. A patch makes its appearance suddenly on any favourite part, spreads rapidly, peripherally, thus soon obtaining a circular form (ringworm), whilst the centre is quite sound, and no maceration of the epidermis is required for its peripheral extension.

2. Eczema marginatum not unfrequently is so very intractable, and so disposed to recur, that, even after the repeated use of remedies sufficiently powerful to remove the whole of the epidermis from the affected part, the disease makes its appearance again, after a longer or shorter interval, on the same parts, and never tends in any case to a spontaneous cure.

Whereas herpes (tinea) tonsurans, when occurring in parts where there are no hairs, and whether attended by vesications or not, is invariably an acute malady, that is, the groups or circles of small vesicles or the red slightly scaly patches characterising the disease, increase in size for a short time (some weeks), then dry up or become pale, and always finally disappear, even without any treatment having been employed. It is only when herpes (tinea) tonsurans occurs on hairy parts, that it is of an intractable character, probably owing to the fact that the fungus (*Trichophyton tonsurans*) invades the hair itself, and constantly infects the surrounding parts afresh from thence.

3. When herpes (tinea) tonsurans occurs in these situations, we find that the hairs in the affected parts lose their glossy appearance, become brittle, and, in fact, break off at various distances, so that an appearance is produced which we can imitate artificially by cutting off some tufts of hairs unevenly with scissors.

When eczema marginatum, however, attacks hairy parts (most commonly the mons veneris) no alteration is produced in the state

of the hairs; they neither change colour, lose their glossy appearance, fall out, nor break off. Nor has any one ever succeeded in demonstrating the presence of fungus therein.

4. In eczema marginatum, the sensation of itching is remarkably severe, and we therefore find distinct evidences of excoriation at the margin of the eruption, whilst in herpes (tinea) tonsurans, though the patient may complain of slight itching, there are no evidences of scratching to be observed.

5. Herpes (tinea) tonsurans not unfrequently occurs more or less epidemically or endemically, that is, many cases are seen at the same time in schools (Cazenave), for instance, or among convicts, &c., whilst such an occurrence is never met with in eczema marginatum.

6. There are, also, such great differences between the two affections in regard to configuration, mode of distribution, and manner of extension of the patches, the parts affected, the pigmentation in the centre of the rings, the amount of desquamation, &c., that no one who is familiar with the two diseases can be in any doubt as to diagnosis, except in the rarest instances, and then only for a short time. The description of the mode of development of eczema marginatum ought to afford some information on this matter.

Course.

At the commencement (which we seldom have an opportunity of witnessing in quite recent cases, but which we may observe often enough at the periphery of a patch of some standing or just recurring) we usually merely see a red, discoid patch, of the size of a lentil, projecting but slightly beyond the level of the skin, and attracting the patient's attention by a sense of itching. Within from ten to fourteen days, the red spot will have attained the size of a fourpenny-piece or of half-a-crown, will have a somewhat depressed centre, a prominent, sharply-defined peripheral border, and will be very slightly scaly on the surface, if the part affected does not come in contact with other portions of skin, whilst, in any situation where the diseased patch does come in contact with some other portion of skin (as, for instance, where the inner surface of the thigh is covered by the scrotum), we find the surface of the patch of an intensely red colour, and not at all scaly. As the circle spreads peripherally, the symptoms mentioned become very noticeable, especially at the

extreme margin of the affected area, whilst the innermost parts are more or less deeply pigmented. Subsequently, however, they become quite normal in colour.

The itching increases in intensity as the disease spreads, and the results of the scratching thus induced become specially evident on the elevated margins of the patches of eczema marginatum, in the form of red, slightly weeping points (*état ponctué*), or of black blood-crusts.

The morbid phenomena now mentioned as characterising eczema marginatum give a somewhat different appearance to the disease, clinically, according to the parts attacked in any particular case, and these varieties scarcely admit of precise description applicable to all instances.

As eczema marginatum has been met with on all parts (I have even, just lately, seen it on the palms of the hands and the soles of the feet), we must first of all answer the questions as to where the disease occurs most frequently, where more rarely, and within what limits as to quality and quantity.

In reference to the first point, I have observed eczema marginatum most frequently on the inner surfaces of the thighs and on the scrotum, whence it spreads to the perineum and the skin of the buttocks, in the form of a large circle (see my 'Atlas der Hautkrankheiten,' iv Lief., Taf. 6, 7, and 8).

Next to this must be mentioned the form of eczema which develops on the trunk, under the influence of moist compresses and binders (during the hydropathic cure); the skin of the front and back of the neck not unfrequently becomes covered with this affection; then comes the eczema met with in the bends of the joints, especially in the axillæ, or on the folds of the pendulous skin of the abdomen, or on the trunk, where coming in contact with large mammæ. It rarely involves large areas of skin. And, lastly, it is met with least frequently of all on the face.

In regard to the second point, in an early stage, eczema marginatum occurs in the form of small circles, scarcely raised above the general surface, whilst, in cases of some duration, the circles may be some twelve inches in diameter, and elevated a line above the surrounding skin.

This extensive development of the patches of eczema marginatum from ordinary peripheral growth, may, in other cases, owing to specially favouring causes, be present from the first, and the disease

may cover large areas at an early stage, as, for instance, occurs in eczema marginatum of the trunk set up by the action of the binders before mentioned, in which case we find a patch, having a breadth of from eight to twelve inches, surrounding the whole circumference of the body, in the form of a red girdle, and having a length of from forty to fifty inches; and the like diffusion may be met with in those cases in which the disease occurs on cutaneous surfaces constantly in contact with one another over considerable areas, as on the abdomen, wall of the thorax, &c.

The least developmental extension is met with when the disease attacks the front or back of the neck, where, not unfrequently, even after the eczema has lasted for years, there may be no circles, and it is characterised merely by central depressions, attended, however, by firm infiltration at the periphery. If it were not that the presence of the fungus renders the diagnosis quite certain, we should be unable to call this affection eczema marginatum, for we usually simply find a red, somewhat elevated disc, with depressed centre, and having a diameter of from one to two inches. In fact, the patch, always quite dry, slightly scaly, furrowed with deep fissures, and itching, looks like a psoriasis plaque, or lichen exud. ruber, much more than it resembles eczema.

I have only met with eczema marginatum on the face in one instance, but that case afforded a most characteristic example of the affection. Not only were the hairy parts of the cheeks, the upper and lower lips, and the chin (where we must consider the malady a sycosis parasitaria) affected, but also the disease had spread in large circles beyond these limits to the skin of the front and back of the neck, on the one hand; and, on the other, to the lower and upper eyelids and to the forehead. It was so intractable that, in spite of the repeated application of remedies, which destroyed the epidermis down to the rete, the disease invariably reappeared again and again. We must not omit to mention that the same patient had patches of eczema marginatum on the left thigh and on the back.

While still presenting the characters mentioned, eczema marginatum will persist for a period of many years, or, in fact, probably, until it is cured by suitable treatment. At least, I fail to recollect any case in which the disease disappeared spontaneously; whilst, on the other hand, I have met with cases in which, according to the patient's statement, it had persisted uninterruptedly for twenty years or more.

When once these larger circles have become fairly developed, they will be found to increase in size but very slowly, even after persisting for years; but, both on adjacent healthy portions of skin, and also within the large circles on the pigmented area, fresh eruptions of papules and vesicles will make their appearance, some of them scratched and covered with black blood-crusts, and others becoming flattened, increasing in size peripherally, paling in the centre, and thus producing fresh circles, which may either coalesce with the older ones or remain isolated.

No other symptoms than those named become developed in connection with eczema marginatum, even after it has persisted for years; for instance, there will be no blebs, pustules, crusts, ulcers, &c., no alteration in the colour of the hair, nor any shedding of the hairs. In one case, which was brought under the notice of the k. k. Gesellschaft der Aerzte, by Docent Dr. Isidor Neumann, fungus was also found in the nails.

Diagnosis.

By due attention to the symptoms of eczema marginatum above given, it will be quite possible in every case to recognise the disease. There is no doubt that it is liable to be confounded, in certain cases, with herpes (tinea) tonsurans, eczema squamosum et papulosum, lichen ruber, psoriasis orbicularis et gyrata, intertrigo, or pityriasis versicolor, but if careful attention be paid to the localisation, and the clinical characters, as a whole, to the course and the morbid products of the disease, together with the results of a microscopic examination, any doubt will soon be removed.

Anatomy.

The epidermis is the substratum of eczema marginatum, as of every other eczema, and we also find those pathological changes (cellular and serous infiltration) in the layers of the skin met with in chronic eczema *per se*.

Between the freshly-formed epidermic cells, found in greatly increased numbers (cell-growth), there are long, doubly-contoured, light-coloured threads (mycelium), which are crossed not unfrequently by darker transverse lines, and between them are seen small circular or oblong corpuscles (conidia), arranged in the direction of the axis of the mycelial threads. From some of the threads, similar

structures branch off laterally, whilst others continue in a straight, or wavy, or spiral course, without giving off any branches. In addition to these structures, we may also find small, round, or oval corpuscles (conidia), having clear centres and dark contours, but we cannot say positively they are such fungus elements as are capable of setting up a cutaneous affection, unless they occur in great numbers, or appear arranged together like pearls on a necklace, because it is well known that we may meet with such elements occurring singly or in small quantity during any microscopic examination of the pathological products of diseases of the skin. The long mycelial threads alone, therefore, can be regarded as diagnostic of the presence of the fungus characteristic of eczema marginatum, though, in addition to them, we may find various other real or supposed fungus elements. Small punctiform corpuscles (micrococcus), though met with in great numbers, do not aid us in our diagnosis.

Etiology.

As long as there was no proof of the constant presence of mycelia, I was of opinion that eczema marginatum was due to prolonged maceration of the epidermis by accumulations of the cutaneous secretion (sweat, sebum). And even after the parasitic nature of the malady was established, the maceration of the epidermis obtained no less consideration as an antecedent condition necessary to the development of the fungus, for experience showed that eczema marginatum only made its appearance on such portions of skin as had been previously softened, loosened in texture, and irritated. This observation rather tends to show the individuality of the disease, and that it differs from tinea (herpes) tonsurans, which, as is well known, does not require any maceration of the epidermis for its development, as has been shown by the experiments undertaken by Peyritch and Pick (in my clinique), also by Köbner,[1] in Breslau, and elsewhere. The latter, indeed, states that he believes he succeeded in inoculating a patient, who came under his care for blennorrhœa, from Trichopyton preparations, folded in paper, on his table, and in producing patches of eczema marginatum, but, as Herr Prof. Köbner himself merely believes this occurred, and is not fully satisfied of the fact, he can hardly expect that any one

[1] 'Klinische und Experimentelle Mittheilungen,' 1864, p. 10.

else will become more convinced than he is himself. Moreover, the experiment which Köbner performed on himself with scales containing fungus, taken from the right thigh of the patient, *e. g.* before mentioned, who was suffering from blennorrhœa, and in which he succeeded by epidermic inoculation in exciting tinea (herpes) tonsurans on his left forearm, does not by any means lead me to assent to his view as to the identity of tinea (herpes) tonsurans and eczema marginatum, but, rather to believe that in these cases we really have to do with tinea (herpes) tonsurans, and not with eczema marginatum, for the latter disease is not by any means so easily transferred from one individual to another, as in the case of the former.

Practically, from our point of view we have chiefly to consider in what way the fungus of eczema marginatum is transferred from one individual to another in the intercourse necessitated in the ordinary affairs of life.

The fact of the frequent occurrence of the disease on the inner surface of the thigh and on the scrotum, led Köbner to suppose that the transference occurred during coitus. Observation, however, and the consideration of statistical data, will lead to the determination of this question much better than theoretical speculation or artificial inoculation.

Eczema marginatum is sufficiently common on the thighs to afford plenty of opportunity for the production of sufficient statistical data, and it must at once strike every one how frequently it occurs in men, and how rarely in women, and especially that, in married persons, it should be met with almost exclusively in only one (mostly the husband) of the pair, though there is every opportunity afforded for transference of the disease. I have, as yet, seen eczema marginatum in husband and wife at the same time in only one instance, whereas I have observed many hundreds of cases in married men having frequent sexual intercourse with their wives, and, also, a few cases in married women whose husbands were not affected, though they lived together constantly.

In the flexures of the joints, in the axillæ, for instance, and, in fact, in any situation where surfaces of skin are permanently in contact, maceration of the epidermis by the cutaneous secretion takes place, and predisposes to the more easy development of fungus germs.

Beneath moist applications and binders, especially if they are not

kept particularly clean, we also see patches of eczema marginatum develop and remain confined to the moistened (fomented) parts. It would be better to give the name eczema marginatum to the eruption first mentioned by me as occurring on parts covered for long with cataplasms, and which I named herpes (tinea) tonsurans, for, when once developed, it does not disappear spontaneously as soon as the cataplasmata are discontinued (as would be the case in herpes (tinea) tonsurans), but persists obstinately for years, and only yields to energetic treatment.

In the same way, the eczema marginatum which occurs on the front and back of the neck is produced by the action of the perspiration and its accumulation between the skin and the shirt-collar.

From all these well-established facts, it results that maceration of the epidermis and irritation of the corium must be produced as the first condition necessary to the development of eczema marginatum, and that, then, the further development of the fungus elements introduced from without takes place on the territory thus suitably prepared.

It is not by any means an easy matter, in spite of the success of inoculation experiments, to say how and in what form such a fungus becomes implanted in the skin.

As in the case of any other contagious malady, whether the infection manifestly occurs by means of a fungus, or by inoculation of a fluid, or in some unknown manner, a special state of the organism, a so-called predisposition, is invariably helpful. In regard to the skin, this can often be shown; for instance, a more copious outbreak of variola occurs on parts which have previously been repeatedly irritated and made hyperæmic, than on other parts which have remained intact, and the same applies to scabies, eczema, and psoriasis, &c. So, again, in eczema marginatum we find that a similar law holds good, for the antecedent maceration of the epidermis affords the *momentum disponens*.

In other parasitic diseases of the skin, the latter remains unknown to us, as in pityriasis versicolor, tinea (herpes) tonsurans, favus, &c., where we are familiar with the *momentum excitans*, but do not know in what way the inoculation takes place unintentionally in the ordinary transactions of life (not intentionally as an experiment).

In certain cases, which I formerly regarded as examples of tinea

(herpes) tonsurans ('see Zeitschrift der Gesellschaft der Aerzte,' 10 Jahrg., 2 Bd., 854 S., 473 u. d. f.), I was able to prove that we can produce an affection of the skin, which I now consider eczema marginatum (as I have already frequently stated), by moist applications, consisting of compresses, which reveal the presence of mould-fungus by their peculiar odour. Whether damp linen forms the vehicle of transmission of the fungus in every case, however, I cannot say.

Neither do I know whether the fungus belonging to eczema marginatum is identical with the *Trichophyton tonsurans* (Malmsten), or whether the Tricothecium of J. Neumann is a species of fungus occurring in this disease solely. So long as Mycologists *ex professo*[1] have not answered the question whether the diverse morphoses of fungi belong to different species, or are simply special stages of development, or have altered their form by cultivation, so long shall we dermatologists be unable to base our diagnosis on the form of the fungus, but must cling to the clinical standpoint as our guiding star in diagnosis.

In what way a parasitic disease of the skin makes its appearance; how it goes through its course; how long it takes to undergo spontaneous involution; what changes it induces in the structures of the skin; what morbid symptoms follow in its train; in what way it is produced; and, lastly, by what means it can most readily and surely be made to disappear; these are the questions demanding answers from us. Whether each of the various maladies has its own special vegetable parasite, or whether all parasitic diseases of the skin may be caused by one and the same fungus, who can demonstrate with scientific exactness? The botanists are here chiefly concerned, and when they are agreed it will then be time for us on our side to set to work industriously at inoculation and cultivation experiments. Truly a fine task for our successors!

Treatment.

The treatment and cure of eczema marginatum is generally disposed of in a few words in books. Authors are content to indicate the principles which must be followed; that is, they say, quite correctly, "that the epidermis must be removed and the fungus

[1] 'Hallier, die pflanzlichen Parasiten des menschlichen Körpers,' Leipzig, 1866. 'Zürn, die Schmarotzer auf und in dem Körper unserer Haussäugethiere,' Weimar, 1874, p. 29 u. d. f.

along with it, and the growth of the latter must be prevented by Sol. Hyd. Mur. Corr., Oleum Cadinum, benzine, and the like;"[1] or, it is said, "in the treatment of eczema marginatum the same remedies are to be applied as in eczema in general;"[2] but we are not told definitely enough how we are to carry out these principles.

Now, if in the treatment of diseases of the skin generally, the method on which we set to work is of greater importance than the remedies themselves, this is especially the case as regards eczema marginatum. There is no doubt that the disease may be equally removed by mechanically scraping away the epidermis with scraping instruments or pumice stone, or by the aid of caustic remedies which destroy the epidermis by chemical action; but, in either case, the real task imposed on us is to use the destructive agents in such a way as neither to injure the patient nor to put him to unnecessary inconvenience.

In the first place, we have to consider whether the patient is in a position to devote his whole time to the treatment of the disease, or whether, from necessity or his own desire, he has to continue at his occupation during the treatment of the eczema.

In the former case, we are able to set to work so energetically that we can remove the disease entirely within from ten days to a fortnight.

For this purpose, we either use soft soap (Sapo Viridis, Schmierseife) or the Ung. Wilkinsoni, as modified by myself, and consisting of sulphur and tar (ana Unc. Tres), soft soap, and Ung. Simp. (ana Unc. Sex), and chalk (drachm. 2). Either of these remedies should be well rubbed into the affected parts with a stiff brush (large or small), morning and evening, for six days, a piece of flannel being subsequently applied over the part.

After the twelfth application, as just described, the flannel coverings are left on for another three days, and are only removed on the tenth day, reckoning from the first application. During this period the parts affected should not be washed, nor should any bath be used; at the end of the ten days, only, a bath should be employed daily, or the parts should be washed, thus completing the cure.

The symptoms which make their appearance on the affected parts during this period, consist, at an early stage, in a dryness and brittleness of the epidermis, which is crossed by numerous fissures and

[1] Köbner, 'Klin. und exp. Mitth.,' a. a. O., S. 12.

[2] 'Neumann's Lehrbuch,' 3 Auflage, p. 552.

cracks, and subsequently (from the fifth day onwards) desquamates in the form of large flakes; not unfrequently the rete is exposed and every movement interfered with and made a source of great pain. These symptoms, however, must not, by any means, induce us to interrupt the inunctions if we wish to attain our end within the time mentioned. It is obvious that with this group of symptoms present, the patient should remain at home, and most suitably in bed, as he will not be able, as a rule, to put on his clothes or move about readily.

If he will not, or cannot, submit to such conditions, it will be impossible to carry out a radical treatment of eczema marginatum in the course of a fortnight; for the destruction of the epidermis, containing the fungus, necessary for the cure, cannot be effected without entailing the unpleasant accompaniment of impeded locomotion. Any other treatment, therefore, which is intended to spare the patient, will either fail altogether in attaining the end in view, or will only do so after a long while—after the lapse of months.

We ought, however, to be well acquainted with such palliative methods of treatment, for many patients cannot be induced, under any circumstances, to submit to an energetic treatment, and yet demand at least some diminution of the irritation. We attain this by washing the parts with soft soap or Spir. Saponis kalinus, or with solutions of alkalies in water (1:100), or of corrosive sublimate in alcohol (1:250), or of carbolic acid in water, alcohol, or oil (1:10), &c., the skin being mopped or rubbed at least twice daily with the remedy, and the parts subsequently covered up, until desquamation of the epidermis is produced, and the latter, together with the fungus, which is the cause of the disease, is destroyed and removed.

The disease is liable to recur in all cases, but far more so in connection with the latter, than the former mode of treatment.

We not unfrequently find indications for using both these plans of treatment, one after the other, for there is often a slight itching remaining after the treatment by Wilkinson's salve, which is removed completely by the use of a lotion (especially a solution of carbolic acid in alcohol).

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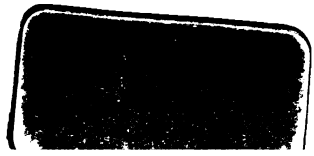
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